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Number 21

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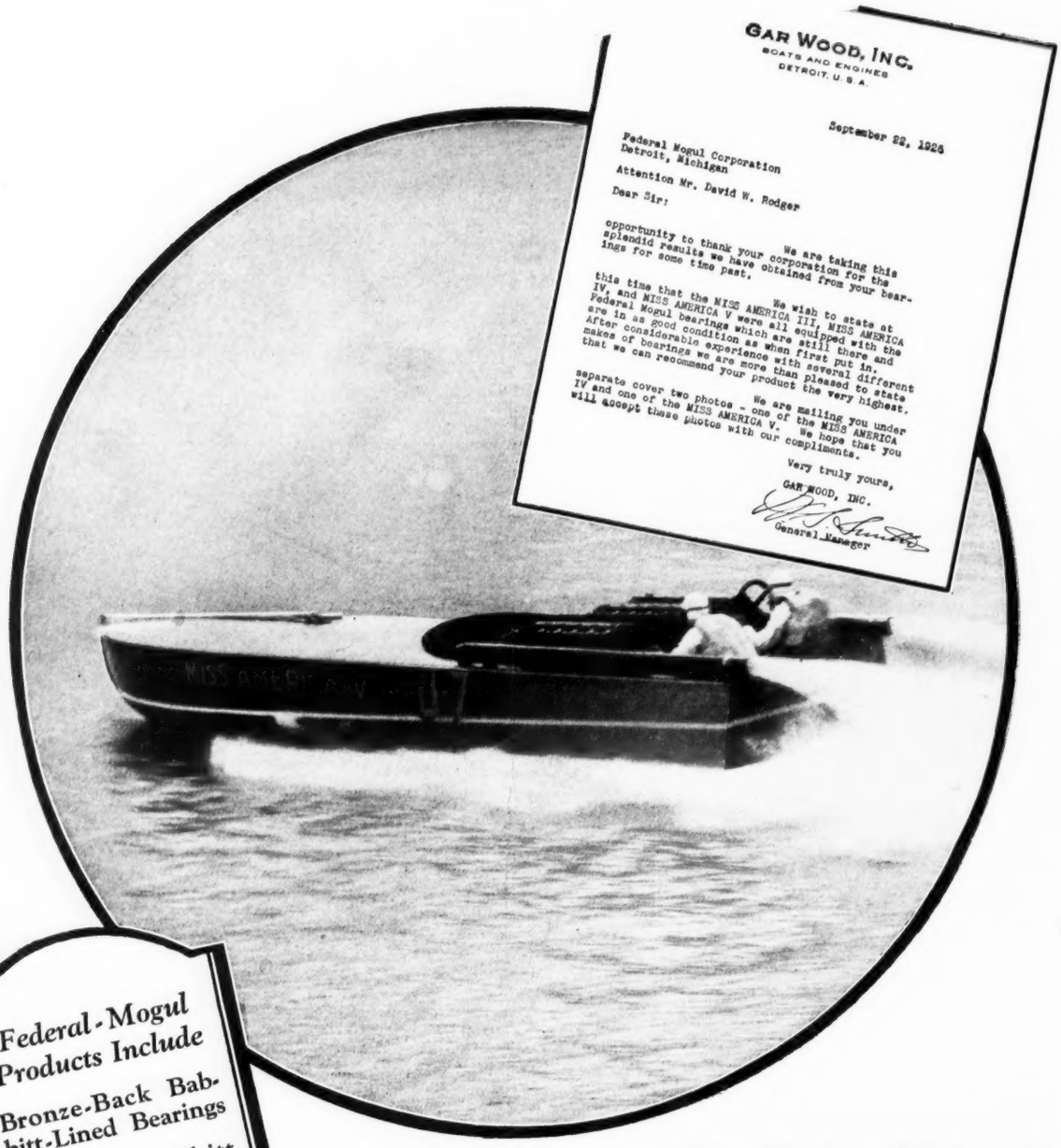
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DETROIT, U. S. A.
September 22, 1926
Federal Mogul Corporation
Detroit, Michigan
Attention Mr. David W. Rodger
Dear Sir:
We are taking this opportunity to thank your corporation for the splendid results we have obtained from your bearings for some time past.
We wish to state at this time that the MISS AMERICA III, MISS AMERICA IV, and MISS AMERICA V were all equipped with the Federal Mogul bearings which are still there and are in as good condition as when first put in. After considerable experience with several different makes of bearings we are more than pleased to state that we can recommend your product the very highest.
We are mailing you under separate cover two photos - one of the MISS AMERICA IV and one of the MISS AMERICA V. We hope that you will accept these photos with our compliments.
Very truly yours,
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Miss America V—Federal-Mogul Both Are World Champions

Miss America V, powered with two 550 H. P. engines recently won the Harmsworth Trophy Race. Miss America III and Miss America IV finished second and third.

All were equipped with Federal-Mogul Bearings. In every speed or endurance test, you will find Federal-Mogul represented—on water, land, and in the air they stand supreme.

Standard equipment on every automotive vehicle where quality counts.

Ask Federal-Mogul engineers to confer with you on your bearing requirements. There will be no obligation on your part.

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AUTOMOTIVE INDUSTRIES

VOLUME 55 *Philadelphia, Thursday, November 18, 1926* NUMBER 21

New German Cars More Powerful and Lower Priced

Models exhibited at Berlin Show indicate that design is influenced largely by foreign competition. Sixes increase in number. Rumpler has front drive.

By Benno R. Dierfeld

THE influence of foreign competition, which set in when the embargo on automobile imports was lifted a little more than a year ago, was clearly visible at this year's Berlin Show, which opened Oct. 29 and closed Nov. 7. German manufacturers, in order to meet this competition, have departed from their previous policy in three respects:

1. They are building an increased number of cars with multi-cylinder engines, especially sixes.
2. The average power has been materially increased.
3. Prices have been reduced due to the introduction of more rational manufacturing methods.

The show, which is referred to as the 25th Anniversary Show, because the chief organizing body, the Association of German Automobile Manufacturers, was founded in 1901, is not as large as that of 1925 since a large proportion of German manufacturers are in financial difficulty and have suspended operations. This, moreover, is the last show that will be reserved for the products of German and Austrian manufacturers. Since the organizing body has been re-admitted to the Federation of Associations of Automobile Manufacturers, next year's show will be international.

Running concurrently with the present show, an exhibit of foreign cars was held at Luna Park, as was done last year, but it was a comparatively small affair.

Owing to the favor with which the buying public regards the more powerful and flexible foreign machines, small cars are not so much in evidence. Typical examples of this class are the Brennabor 25 hp.* and the Wanderer 30 hp., both four-cylinder machines. An illustration of the Wanderer engine is shown in Fig. 1. It is of the valve-in-head type, and the exhaust manifold is cast integral with the head and provided with integral cooling flanges. The valves are provided with double springs and are operated from a camshaft in the crankcase through tappet rods extending up the side of the cylinder block and guided in the head. The chamber at the forward end of the cylinder head encloses a thermostat, and the water outlet, from which connection is made to the radiator, is located directly above it. The water pump is combined with the fan and built into the forward end of the cylinder block, the combined unit being driven from the crankshaft by a substantial flat belt. In the illustration, *1* is a lever by means of which the timing chain is adjusted and *2* a nut which locks the adjustment, while *3* is a cap screw holding the generator in place.

Six-cylinder models are being shown in considerable number, a good example being the Simson-Supra represented in Fig. 2. It has 76 by 115 mm. (3 by 4½ in.) cylinders and develops 60 hp. The valves are located in the detachable head and operated through rockers and pushrods from a camshaft in the crankcase. Generator and water pump are arranged symmetrically on opposite sides of the engine and driven through helical gears. As may be seen from the illustration, the high tension cables are carried through a passage formed in the cylinder block from one side to the other. The clutch is a dry plate type and the trans-

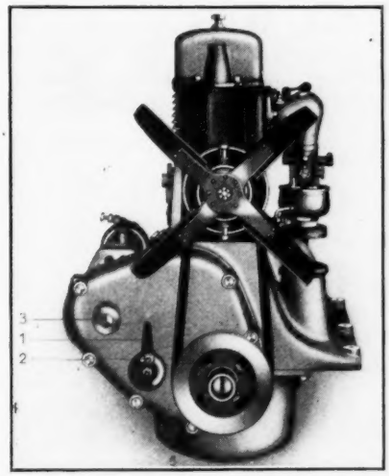


Fig. 1. Wanderer 30 hp. engine

* In this and all succeeding cases the horsepower given is the maximum developed by the engine, and not the German tax rating.

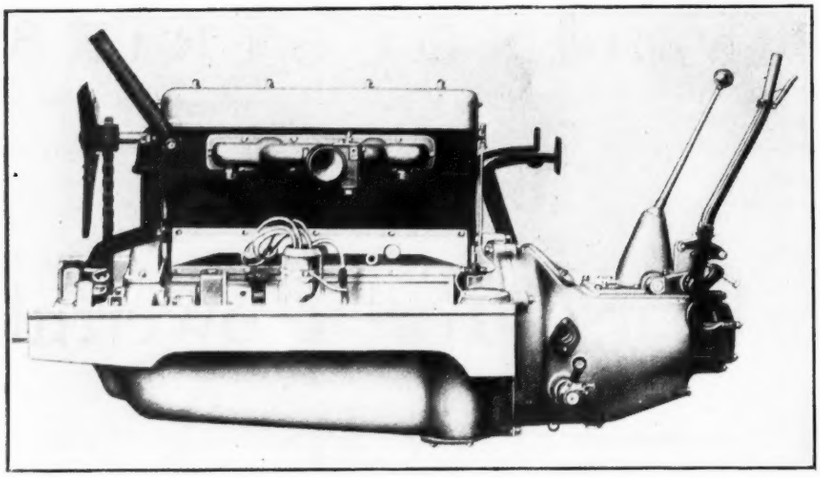


Fig. 2. Simson-Supra six-cylinder engine

mission gives four forward speeds. Oil from the transmission case automatically lubricates the enclosed single universal joint. A seven-passenger closed car of this type sells at 12,500 marks, which is about the same as is asked for American cars of the same size and power in Germany.

Two new models of particular interest are those of 38 and 55 hp. which Dr. Porsche has designed for the Mercedes-Benz Works. The 38 hp. has a cylinder displacement of 122 cu. in., and with a four-passenger open body sells at 7800 marks. Of perhaps more interest to the American reader is the 55 hp., which has a displacement of 183 cu. in. The L-head cylinders have a bore and stroke of 74 by 115 mm. (2 15/16 by 4½ in.). Among the engine features are a detachable cylinder head, cast-iron pistons, light alloy crankcase and camshaft drive by helical gears. The four-speed transmission forms a block with the engine. Long semi-elliptic springs are used and four-wheel brakes are fitted. The chassis weight is 2200 lb. and a speed of 100 km. or 62.5 m.p.h. is attained. The price of the seven-passenger open car is 11,800 marks and that of the inside drive limousine, 13,800 marks. Both prices are very low in view of the reputation of the firm and the quality of its work.

The Opel Works, the largest German manufacturers, have a new six-cylinder model designed by Dr. Fritz Opel. It has 89 by 105 mm. (3.5 by 4.14 in.) L-head cylinders, a seven-bearing crankshaft and chain drive for the camshaft and accessories. Battery ignition is employed. The transmission is a separate unit and the drive is through a propeller shaft with a single enclosed universal joint.

Two eight-cylinder models are being shown, a Hansa-Lloyd, a revised edition of the eight of this make shown last year, with 320 cu. in. displacement and delivering 100 hp. at 2700 r.p.m., and a Horch. The latter is the design of Paul Daimler, formerly chief engineer of the Daimler Motor Co. of Stuttgart-Unterturkheim. The engine, of which one view is shown in Fig. 4, has 2.55 by 4.65 in. cylinders and develops 60 hp. It has a five-bearing crankshaft, valves in the head, two overhead camshafts acting directly on the valves without rollers or rocker levers, battery ignition and pump cooling with thermostat control. An air cleaner is also provided. The clutch is of the dry-disk type and the transmission, which is built integral with the engine, gives four forward speeds.

Interesting Spring Arrangement

A detail feature of chassis design that is of interest is the arrangement of the rear cantilever springs on the Brennabor, of which Eduard Reichstein is the designer. This is illustrated in Fig. 5. It will be noticed that the frame channel is of very deep section and the spring is located inside the channel.

On the N. A. G. the steering knuckle spindle is offset with respect to the knuckle pivot, which produces a trailing effect. An original rear-spring mounting is used on the Presto car. The spring saddle, as will be seen by reference to Fig. 6, is swiveled underneath the axle, which is claimed to distribute the load evenly between its two halves.

Dr. Edmund Rumpler, who some years ago came out with a car of streamline form which he referred to as the "drop" car, has given up that design and applied some of the principles involved in the powerplant and transmission to a front-driven car of conventional form. In fact, he has swung his powerplant-axle unit around and mounted it at the front of the car, as shown in Fig. 7. The four-cylinder, 50 hp. engine drives through a three-speed transmission to a differential at the center

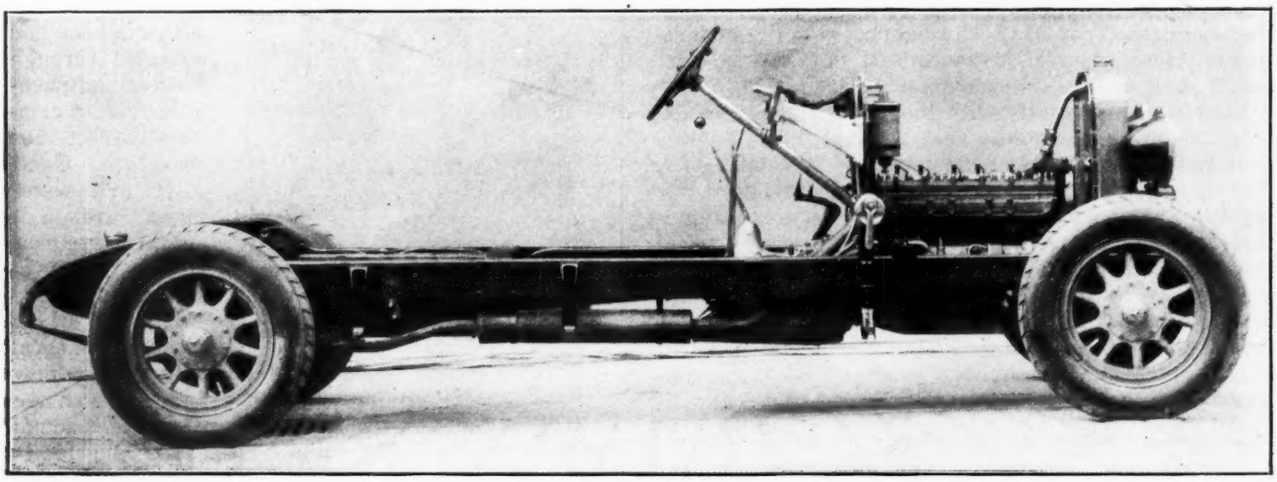


Fig. 3. Mercedes-Benz 55 hp. six-cylinder chassis

of the front axle around which the halves of the axle are adapted to swing. Universal joints are located inside the steering knuckles, so that power can be transmitted to the front wheels whether they are in the straight-ahead or in any angular position. As the universals operate at an angle only when the wheels are swung around in steering, they cause practically no power loss. Each front axle half is connected to its side of the chassis frame by two transverse quarter-elliptic springs. Steering is through separate drag links to each of the steering knuckles, from a screw and nut type of steering gear.

This car has no rear axle properly so-called. Each rear wheel is mounted on a stub axle carried at the end of a lever pivoted to the frame rail, both levers swinging around a shaft passing through the frame side rails. Vertical forces on the stub axles are taken up on two quarter-elliptic springs on each side, making an angle with the longitudinal axis of the chassis and with the frame rails. Forces due to the angular arrangement of the springs, lateral shocks and braking are fully provided for in the design. One advantage of this arrangement is that it permits of the use of straight frame members (without kick-up) and still has a low-hung frame and a low center of gravity. The entire frame is made of Lautal, a new light alloy. Exceptional riding qualities are claimed for this car, and in view of the small amount of unsprung weight this claim is probably well-founded.

New Type of Taxicab

A new type of taxicab is the Hanomag shown in Fig. 9. It is equipped with a single-cylinder 10 hp. engine with chain drive to the rear axle. The body has two seats side by side, for the driver and passenger respectively, but they are separated by a partition with a window in it. These small and rapid cabs are being much used, their fares being comparatively low.

A good example of modern German truck engines is the N. A. G. which is built in both four and six-cylinder models. The four-cylinder has cylinders of 5.31 by 6.70 in. bore and stroke and delivers 75 hp. The cylinders are cast in pairs and the heads are detachable.

Two M. A. N. (Maschinenfabrik Augsburg-Nurnberg) Diesel-type truck engines were shown, a four and a six-cylinder. Fig. 10 shows the four-cylinder engine combined with its clutch and transmission. The cylinder dimensions are substantially 4½ by 7⅛ in. and the maximum output is 53 hp. at 1100 r.p.m. [A full description of this engine, with drawings, appeared in *Automotive Industries* of March 25, 1926—Editor]. The six-cylinder engine gives 80-85 hp. at 1400 r.p.m.

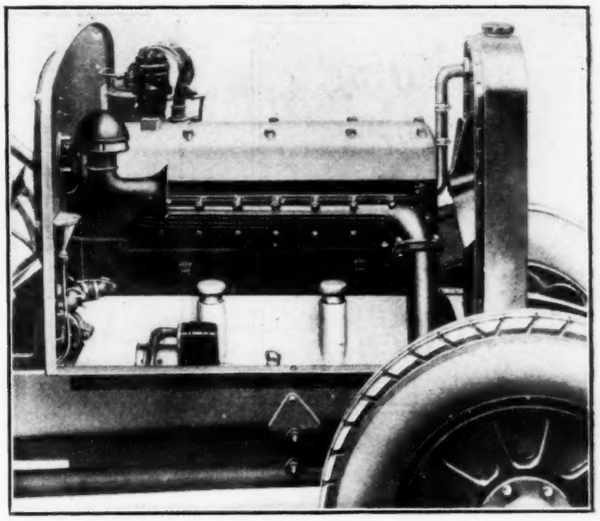


Fig. 4. Horch eight-cylinder vertical engine

A rather novel type of bus is being built by several firms for the German Post-Office Department, which conducts bus and parcels services throughout the country. This bus has seats for 19 passengers on a lower level at the forward end and seats for an additional nine passengers on a higher level at the rear. The space below this higher level compartment, which measures 88 cu. ft., is used for baggage. The upper level compartment is entered from the other compartment by a stairway. The object of the diagonal rods on the roof of the bus is to protect the projecting portion against damage from overhanging trees, etc. What may be called the monitor projects only 17¾ in. above the roof. Within the lower compartment the headroom is 78 in., which is ample to permit passengers to stand erect.

A similar bus equipped with a six-cylinder engine—the same as most of the newer German buses—is exhibited by Daimler-Benz.

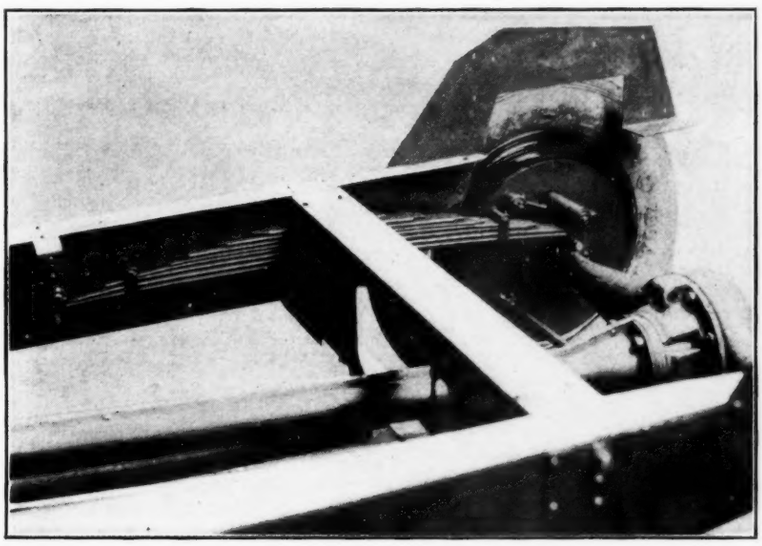


Fig. 5. Brennabor frame and rear spring design

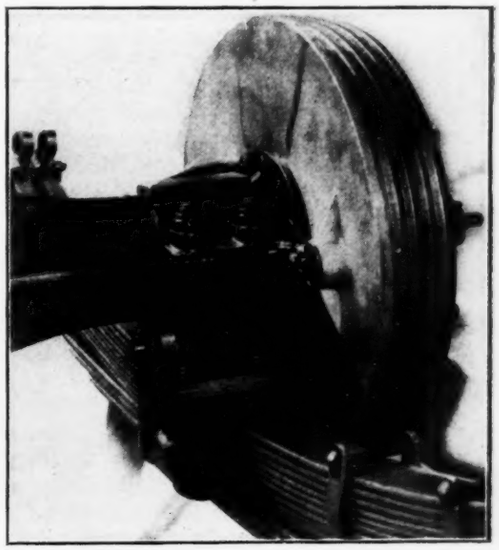


Fig. 6. Presto rear spring design

Interesting Features of German Design

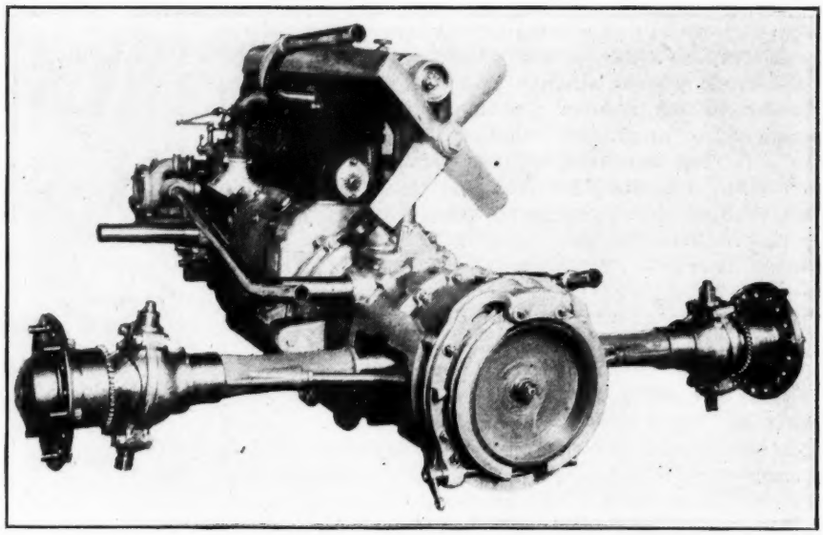


Fig. 7. Rumpler power-plant-front axle unit

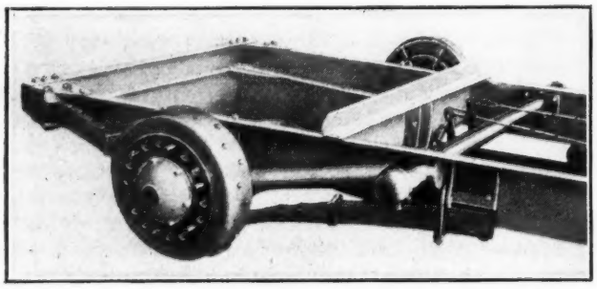


Fig. 8. Rumpler rear construction

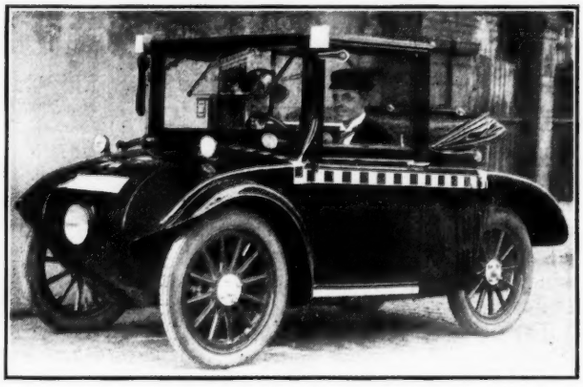


Fig. 9. Hanomag 10 hp. taxicab

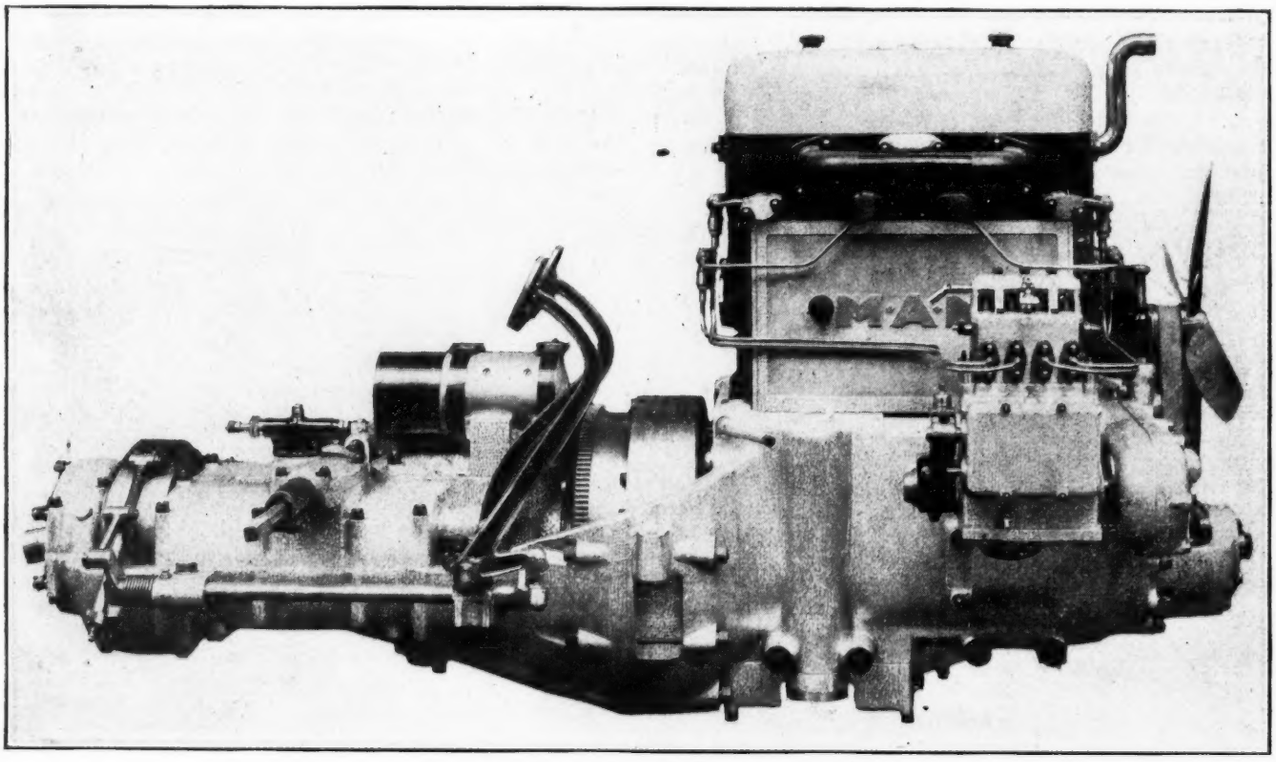


Fig. 10. M.A.N. Diesel truck powerplant

Hupp Gives Independent Garages 25% Discount on Parts

New policy governing distribution of replacement parts will make them more accessible to car owners.

By Lewis C. Dibble

CERTAIN selected independent garages will be granted a 25 per cent discount on genuine Hupmobile replacement parts as a result of a new policy which has just been adopted by the Hupp Motor Car Corp.

The plan has been evolved with the paramount idea of convenience for the car owner and to assure the placing of only genuine parts in Hupmobile automobiles. For the privilege of obtaining Hupmobile parts at a discount, the garage signs an agreement to use only genuine Hupmobile replacement parts bought from authorized Hupmobile distributors or dealers. Acceptance of the agreement does not give the garage the exclusive privilege of selling genuine parts in its particular city or town.

By the Hupmobile plan, independent garages will not make application to the manufacturer for the discount privileges, nor will the factory solicit the independent garage, this phase of the plan being left entirely to the distributor and dealer organization.

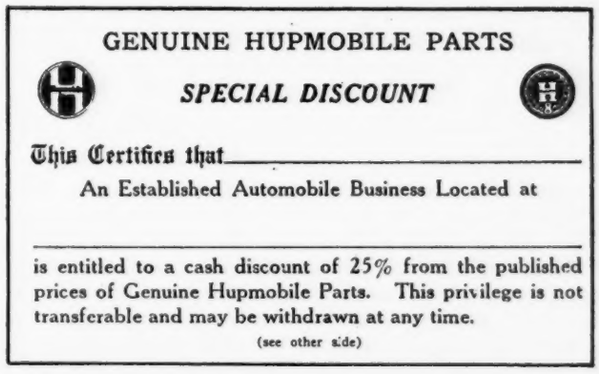
It will be up to the dealer in each territory to make a study of the independent garage seeking the discount to satisfy himself that the shop and its mechanics are capable of properly servicing Hupmobile cars and also to determine whether the granting of the courtesy would be of benefit to Hupmobile owners.

Service Facilities Broadened

In selecting independent garages to whom the courtesy will be granted, dealers also keep in mind the accessibility of the shop to regular Hupmobile owners. It will be the idea to extend the courtesy to those independent garages located on main traveled streets and at advantageous points through the rural districts, thus extending the service facilities on as broad a scale as possible.

In limiting the number of independent garages which will receive the courtesy, the corporation has kept several various factors in mind, according to C. E. Salisbury, director of service. First, the corporation will not expect dealers to extend the courtesy to independent garages which are openly in competition with the dealer's service station, and second, it is desired that only independent garages doing a satisfactory class of work shall be selected.

Application blanks, entitled "Application for Privilege of Selling Genuine Hupmobile Replacement Parts," are printed in triplicate, one copy going to the applicant, one to the dealer issuing it and the third to the factory.


GENUINE HUPMOBILE PARTS

SPECIAL DISCOUNT

This Certifies that_____

An Established Automobile Business Located at

_____

is entitled to a cash discount of 25% from the published prices of Genuine Hupmobile Parts. This privilege is not transferable and may be withdrawn at any time.

(see other side)

Hupmobile replacement parts discount courtesy card—On the reverse side it says: "It is mutually agreed that this 25 per cent cash discount on genuine Hupmobile parts will be allowed only to the firm named on the other side of this card for parts installed by them in their own shop. Parts will be delivered only to authorized representative upon presentation of this discount card"

The applicant, after giving his name and address, fills in blanks to show the size of his showroom, car repair accommodations, number of mechanics ordinarily employed and the number of Hupmobiles repaired a day. The blank also specifies whether work is charged for by the hour or by flat rate. The application also provides a section showing the makes of cars ordinarily serviced in the garage, whether the independent dealer is a direct dealer or a sub-dealer for any makes of cars and whether or not he has an agreement similar to Hupmobile's with any other companies.

When the application is received at the factory over the approval signature of the Hupmobile dealer, the courtesy discount card, carried in a neat little leather folder bearing the Hupmobile trademark, is mailed to the independent garage.

The garage agrees that it will not use the name of the Hupp Motor Car Corp., or name of the distributor or dealer with whom the agreement was made, as a part of its firm name, or designate its place of business without full authority of the parties interested.

It is further agreed by the garage that it will sell new Hupmobile parts at prices not to exceed the prices as shown on the invoice, and it is understood that these prices are subject to change without notice.

Provision is made that the discount card is not transferable and is to be presented only by the person to whom issued, and if irregularly used will be taken up by the authorized representatives of the distributor or dealer. It is also provided that the privilege of purchasing parts at a discount can be withdrawn at any time.

Automotive Industries
November 18, 1926

Engine Efficiency Gain of 20% Now in Sight

Compression ratio of 7 to 1 practicable with anti-knock fuels. Super-expansion idea shown to be of small value.

By P. M. Heldt

THE recent report of the Federal Oil Conservation Board has focused attention again on the subject of fuel economy. It was pointed out in that report that the thermal efficiency of present-day internal combustion engines is comparatively low, and that a certain saving in fuel may be expected from improvements in engine design.

Although it is possible to obtain from an automobile engine on the test stand one brake horsepower-hour from 0.6 lb. of fuel or less, which, with the normal heat value of gasoline of 19,000 B.T.U. per pound, corresponds to a brake thermal efficiency of 22.3 per cent, the average efficiency in regular operation is much lower. It has sometimes been set at 5 per cent, and this probably is substantially correct for conditions of city operation. This, of course, is exceedingly low.

This low efficiency is due in part to the fact that the automobile engine carries an average load of only 15 to 20 per cent of its full load, and the efficiency of the engine decreases with the load carried by it. If cars were fitted with smaller engines, the average power factor, or the proportion of the average to the full load, would be greater. But this would mean more gear shifting and more running on low and intermediate, to which most American motorists object. Hence it is not likely that piston displacement will be materially reduced as long as fuel continues to sell at anywhere near present prices.

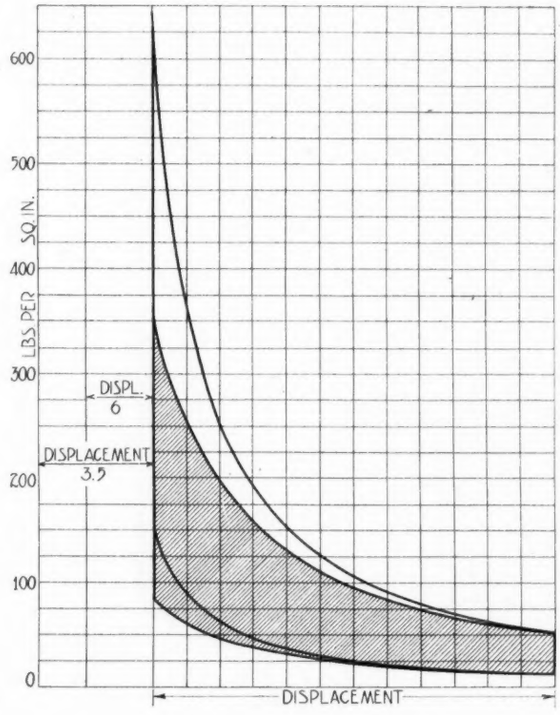


Fig. 1—*Theoretical cylinder diagrams for compression ratios of 4.5 and 7*

The other alternative consists in making the engine inherently more efficient by increasing its ratio of expansion. In the ordinary engine the expansion ratio is equal to the compression ratio, and the theoretical thermal efficiency then depends upon the compression ratio. We can increase the expansion ratio in two ways—by increasing the compression ratio, and by expanding the burning charge to a volume larger than that occupied by it before compression.

With present day commercial fuels it is not practical to increase the compression ratio beyond 4.5 to 1, or at most 5 to 1, as a higher rate will result in detonation. But if anti-detonating fuels should find a wide market and their distribution become general, it is not inconceivable that engine builders would design their engines to operate at higher compressions, to take full advantage of the qualities of the fuel. With fuels of the characteristics of ethyl gasoline, for instance, a compression ratio of 7 to 1 would be quite practicable.

According to Ricardo, when the compression ratio is varied the thermal efficiency varies in substantially the same ratio as the air cycle efficiency, which is given by the expression

$$\eta = 1 - \frac{1}{r^{\gamma-1}}$$

where r is the volumetric compression ratio and γ the ratio of specific heats, viz., 1.405. If this is correct, then, when the compression ratio is increased from 4.5 to 7, the thermal efficiency should increase in the ratio

$$\left(1 - \frac{1}{4.5^{0.405}}\right) : \left(1 - \frac{1}{7^{0.405}}\right)$$

$$= 0.456 : 0.544$$

$$= 1.00 : 1.19$$

It would therefore seem that if the compression ratio is increased from 4.5 to 7 the thermal efficiency is increased 19 per cent.

There is another way of calculating the gain in effi-

ciency due to an increase in the compression ratio, and that is by figuring the amount of mechanical energy developed per charge with each ratio. This necessitates the assumption that the multiplication of the cylinder pressure on ignition is the same for all compression ratios. On the one hand it might be expected that this ratio would be somewhat greater with higher compression ratios, as the charge is then purer, but, on the other hand, owing to the higher initial temperature the heat loss to the jacket is undoubtedly greater with the higher compression. The two influences probably cancel each other substantially, and this warrants the above assumption of constancy of the pressure multiplication ratio.

Energy Developed Per Charge

In Fig. 1 are shown theoretical indicator diagrams for cylinders with compression ratios of 4.5 and 7 respectively. The corners have not been taken off, as they would be in an actual diagram, because the effect on the areas of the two diagrams would be the same, and only comparative results are aimed at here. The energy in ft.-lb. represented by each diagram is given by the equation

$$W = \frac{D\,P_i}{3.6}\,(a-1)\,\frac{r^{1.3}-r}{r-1},$$

where D is the piston displacement in cubic inches; a the ratio of pressure multiplication on ignition; P_i the initial pressure in the cylinder at the beginning of the compression stroke, and r the compression ratio. Placing P_i at 12 lb. p. sq. in. absolute and a at 4.25, we get for the energy developed per charge with a compression ratio of 4.5

$$W = \frac{D \times 12}{3.6} \times (4.25-1) \times \frac{7.066-4.5}{4.5-1}$$

$$= 10.82\,D \times 0.733 = 7.93\,D\ \text{ft.-lb.}$$

Similarly, for a compression ratio of 7 we get

$$W = \frac{D \times 12}{3.6}\,(4.25-1) \times \frac{12.55-7}{7-1}$$

$$= 10.82\,D \times 0.925 = 10.00\,D\ \text{ft.-lb.}$$

These figures indicate a gain of 26 per cent in energy per charge and hence, since the amount of fuel taken in per charge is the same, an increase in the thermal efficiency of 26 per cent. That the figure arrived at by this method is not the same as that arrived at by the former method is evidently due to the fact that the equation for the air-cycle efficiency does not take account of the energy consumed in compression.

The above figures apply directly to the gain in indicated energy, and the relation of the indicated horsepowers would be the same. Although the gas pressures are somewhat higher with the higher compression, there is no reason for expecting a material increase in the friction losses. In fact, it is quite reasonable to assume that the friction losses will be substantially the same in both cases. To obtain the brake horsepowers we would therefore have to subtract the same figure from the two indicated horsepowers and it is obvious that the proportional gain in brake horsepower would be greater than the gain in indicated horsepower.

It would therefore appear that an increase in brake horsepower of from 20 to 25 per cent would result from an increase in the compression ratio from 4.5 to 7, and since the fuel consumption would remain the same, the brake thermal efficiency would increase in the same proportion.

The other method of increasing the expansion ratio is by continuing the expansion beyond the volume which the charge occupied when at atmospheric pressure previous to compression. In the early days of the gas engine, Atkinson invented a compound crank mechanism whereby the piston would perform alternately two long and two short strokes, the expansion and exhaust strokes being long and the inlet and compression strokes short. The idea was, of course, to expand the gases more nearly to atmospheric pressure and thus utilize the power remaining in them in the ordinary engine when the exhaust valve is lifted and they are allowed to escape to the atmosphere.

This idea of increasing the expansion by using unequal inlet and expansion strokes has been revived at intervals, and quite recently the design shown in Fig. 2 was patented in England. Use is made of two pistons in each cylinder, each piston being connected to its own crankshaft. The two crankshafts are connected by gearing in such a manner that the upper one rotates at half the speed of the lower one. During the inlet stroke the two pistons move in the same direction, but, one crank turning twice as fast as the other, the lower piston moves much more rapidly than the upper one and the distance between them increases though both are moving in the same direction. During the following compression stroke the two pistons move again in the same direction (in the opposite direction as during the inlet stroke), and thus the relative motion between them is small. Then follows the power stroke, during which the slow upper piston continues to move upward while the faster lower piston now moves downward. At the end of the power stroke both pistons are in their extreme positions, while at the beginning of this stroke the lower piston is at the top end of its stroke while the upper piston is at midstroke. Hence the effective stroke or expansion movement is equal to the full stroke of the lower plus one-half the stroke of the upper piston. The individual motions of both pistons and the relative motion between the two are shown by curves in Fig. 3.

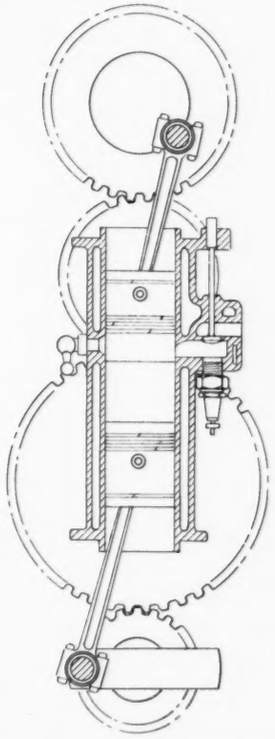


Fig. 2—*Double piston engine with compression and expansion strokes twice as long as the inlet and compression strokes*

It is, however, not necessary to go to the complication of such special designs to effect a double expansion, as the same purpose can be accomplished readily by a change in the valve timing. Assume, for instance, that in an ordinary engine the inlet valves are so timed that they close when the piston has completed one-half the inlet stroke, so that the amount of charge taken into the cylinder is about

one-half that which would be taken in normally.

The charge will then be expanded during the remainder of the inlet stroke and at the end of that stroke the pressure within the cylinder will be less than one-half atmosphere, as shown in Fig. 5. During this last half of the inlet stroke a considerable amount of energy will be absorbed, because the atmosphere presses against the outside of the piston with full atmospheric pressure, while the pressure against the piston head will be less, and the piston must overcome the difference in the pressures on its two sides.

This work, however, is returned during the first half of the compression stroke, when the same difference exists on opposite sides of the piston as during corresponding points of the inlet stroke, but while during the latter part of the inlet stroke the excess pressure is opposite in direction to the motion of the piston, during the first part of the compression stroke it is in the same direction as the motion of the piston and therefore returns energy to the latter.

During the last half of the compression stroke the fuel charge is then compressed in the ratio of 4.5 to 1 and during the first half of the following expansion stroke it is expanded in the same proportion. Hence, compression and expansion during the upper half of the stroke proceed as normally, and this part of the cycle will give the usual thermal efficiency, but the expansion is then continued, and this, of course, yields additional work. There is nothing in the inlet and compression strokes to offset this, as the energy expended in expanding the charge during the inlet stroke to almost twice its volume at atmospheric pressure is returned again during the first half of the compression stroke, when atmospheric pressure helps to compress the charge.

With the ordinary engine, if the expansion were continued to the end of the power stroke—the exhaust valve remaining closed up to that point—the pressure of the gases would be reduced to about 51 lb. p. sq. in. absolute or about 36 lb. gage. In actual operation the exhaust valve is opened some time before the piston reaches the end of the down stroke, and the pressure is then still somewhat higher, while at the end of the stroke, because of the escape of the gases, it has come down nearly to atmospheric.

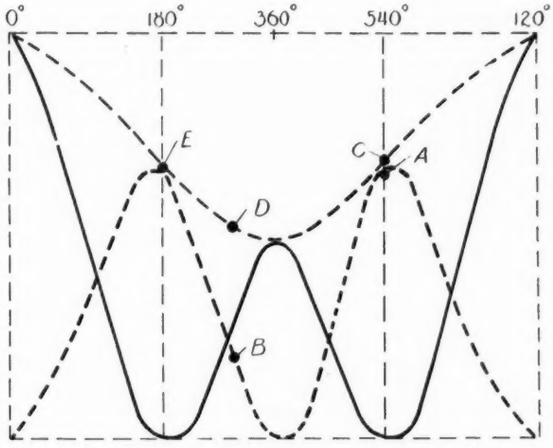


Fig. 3—*Piston motion curves for double piston engine*

We must now calculate the work represented by the super-expansion loop in Fig. 5. Let V_i *and* P_i be the volume and the pressure of the gas in the cylinder at midstroke when the normal expansion has come to an end and super-expansion begins, and V and P the volume and pressure at any point of the super-expansion stroke. We then have the relation

$$P\,V^{1.3} = P_i\,V_i^{1.3}$$

from which it follows that

$$P = P_i\,V_i^{1.3}\,V^{-1.3}$$

The value of V_i in this case, as was pointed out in the foregoing, is 51 lb. p. sq. in. abs. and the value of V in terms of the normal (one-half the total) displacement D is

$$V_i = D + D/3.5 = 1.285\,D.$$

Hence, inserting in the above equation for P we get—

Fig. 4—*(Below) Cylinder diagram of engine in which expansion stroke is equal to twice the inlet stroke*

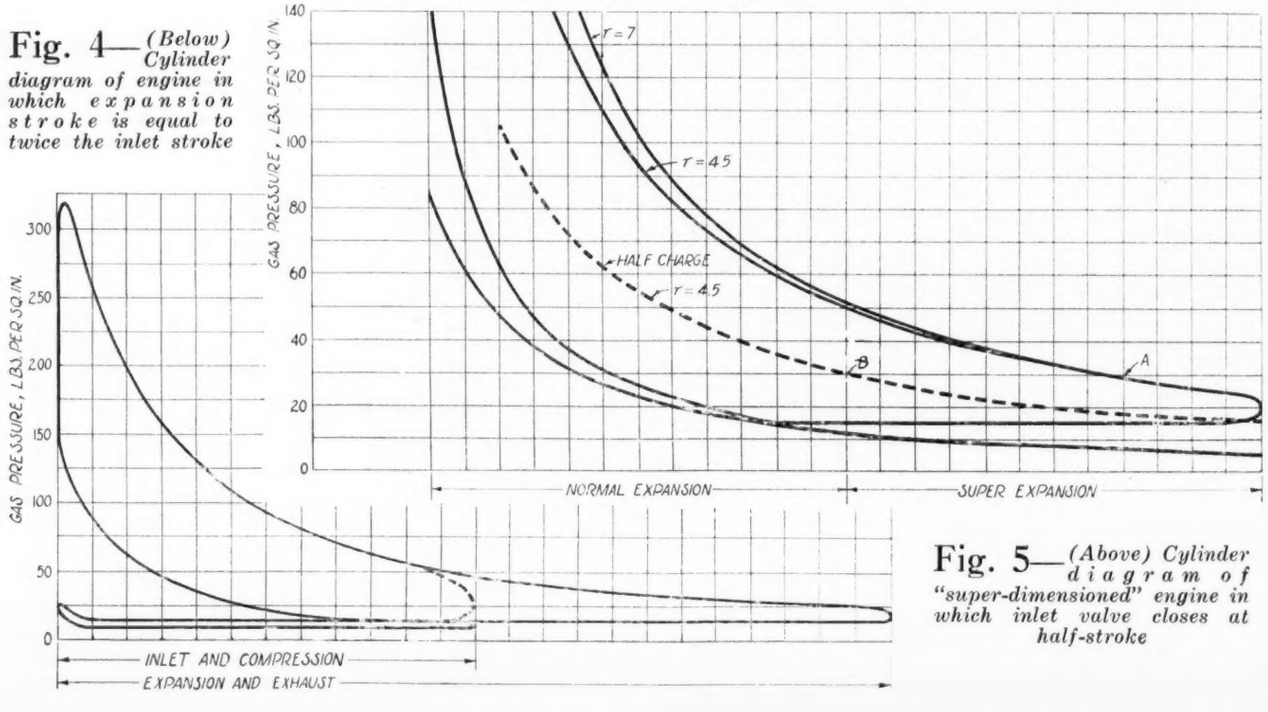


Fig. 5—*(Above) Cylinder diagram of "super-dimensioned" engine in which inlet valve closes at half-stroke*

$$P = 51 \times 1.285^{1.3} D^{1.3} V^{-1.3} \text{ lb.}$$

$$= 70.7 D^{1.3} V^{-1.3} \text{ lb.}$$

The work done while the volume increases from V to $V + dV$ is PdV, and substituting the value of P found above we have

$$dW = 70.7 D^{1.3} V^{-1.3} dV \text{ in. lb.}$$

$$= 5.9 D^{1.3} V^{-1.3} dV \text{ ft. lb.}$$

To find the total work of super-expansion we must integrate the above expression between the values of V at the beginning and at the end of the super-expansion, namely $1.285 D$ and $2.285 D$. We then have

$$W = \int_{1.285 D}^{2.285 D} 5.9 D^{1.3} V^{-1.3} dV$$

$$= \frac{5.9}{0.3} D^{1.3} \left(\frac{1}{1.285^{.03}} - \frac{1}{2.285^{.03}} \right) D^{-0.3}$$

$$= \frac{5.9}{0.3} \left(0.927 - 0.781 \right) D$$

$$= 2.87 D$$

From this we must subtract the work done in overcoming the pressure of the atmosphere, which is equal to

$$\frac{14.7 \times D}{12} = 1.225 D$$

which makes the useful work due to the super-expansion

$$2.87 D - 1.22 D = 1.65 D \text{ ft.-lb.}$$

Since the normal expansion yields 7.93 D ft.-lb. of work, the gain by super-expansion is

$$\frac{1.65 \times 100}{7.93} = 20.8 \text{ per cent.}$$

This is the gain in indicated power under full load or full torque conditions and would seem to be well worth while. Unfortunately, the gain in brake horsepower will not be nearly as great, for the reason that by doubling the displacement we also greatly increase the mechanical losses. Ordinarily the losses due to internal friction, etc., are considered to be proportional to the displacement. For instance, if we assume that all linear dimensions are increased proportionately, then, since both the diameter and the length of the piston are increased the area of the oil film which must be sheared as the piston reciprocates is increased in the proportion of the square of the increase of the linear dimensions, and since the stroke is increased in the same proportion, the power lost in overcoming the resistance of the oil film to shear increases as the cube of the linear dimensions or as the displacement.

The proportional loss due to internal friction varies, of course, with the design and with the workmanship, but for an approximation we may assume it to amount to 15 per cent of the indicated power. The energy loss due to this friction per cycle then is

$$0.15 \times 7.93 D = 1.19 D \text{ ft.-lb.}$$

By doubling the displacement we double the friction loss, hence there is an extra loss of 1.19 D, and since the gross gain in mechanical energy due to super-expansion is 1.65 D, the net gain is only

$$1.65 D - 1.19 D = 0.46 D$$

The net energy of normal expansion is

$$7.93 D - 1.19 D = 6.74 D,$$

so the proportional gain in brake horsepower due to super-expansion by doubling the displacement without increasing the charge is only

$$\frac{0.46 \times 100}{6.74} = 6.8 \text{ per cent.}$$

The gain is even less under conditions of part load, because then the pressure is lower throughout the expansion stroke and the gross gain due to super-expansion is much less, whereas the additional loss due to the increased displacement remains unchanged.

Internal losses equal to 15 per cent of the indicated power correspond substantially to a frictional force of 15 lb. p. sq. in. of piston head area, hence any expansion to a lower pressure than 15 lb. gage is unprofitable. As may be seen by reference to Fig. 5, when the engine is drawing a full charge, this pressure is reached when the displacement reaches 166 per cent of normal (point A), and this would be the proper point at which to end the expansion if the engine ran normally under practically full load.

In automobile work, since the average torque load is far below the maximum, expansion to this point would not be warranted, however, since the additional friction would overbalance the gain due to the extra expansion. We may assume the delivery of half full torque to be an average condition. As a matter of fact, a normally powered car proceeding at 30-35 m.p.h. over a smooth, hard, level road calls for less than one-third the full torque of the engine, but in touring and otherwise when driving long distances, the power of the engine is drawn upon to a larger degree. By figuring on one-half full torque we therefore really favor the super-expansion plan in the comparison.

Expansion pressures corresponding to a one-half charge are indicated in Fig. 5 by the dotted line, and it will be noticed that a pressure of 30 lb. absolute or 15 lb. gage is reached at the end of the normal expansion. This, as has been pointed out, is just sufficient to overcome the internal friction, consequently it does not pay to continue the expansion further.

From the above the conclusion may be drawn that super-expansion in so-called super-dimensioned engines holds out little hope of improving the thermal efficiency of automobile engines. It has been seriously proposed for aircraft engines and may have some advantages in that field, as well as in other lines of application where the average power factor is high, as in tractor and marine work. In automobile work the only hope lies in an increase in the compression ratio.

It should be pointed out in this connection that in engines of special design in which the expansion stroke is longer than the inlet stroke the frictional losses are not increased in the same proportion as in the super-dimensioned engine. For instance, if the expansion displacement is doubled, since the displacement during the inlet and compression strokes remains the same, the frictional losses evidently would be increased only 50 per cent, instead of being doubled, and from this point of view the special designs have an advantage over the super-dimensioned engine.

U. S. and Canada Supply 60% of Cars in Use Abroad

Principal automobile-importing countries show increasing preference for American-made vehicles. Less than 35% of total exports in 1921 originated here. Markets analyzed.

By K. W. Stillman

UNITED STATES and Canadian manufacturers of motor vehicles are not only holding their strong position in the markets of the world but indications are that their position has been and still is undergoing improvement in spite of the rapidly developing competition of European manufacturers.

Based on import data for 12 representative countries of the world, which include most of the important motor vehicle markets, exports in 1921 from the United States and Canada furnished less than 35 per cent of the total accretion to the foreign motor vehicle population, while in 1925 the proportion supplied by this country had increased to nearly 60 per cent.

These figures, particularly the latter one, check with estimates made of the proportion of American motor vehicles in operation in the various countries of the world. In the same 12 countries referred to before approximately 60 per cent of all vehicles in operation during 1926 are estimated to be of American origin.

The countries considered in this study are: Belgium, Spain, Sweden and the British Isles in Europe; Argentine, Brazil, Cuba and Mexico in the Americas; British South Africa; India, and Australia and New Zealand.

Selection of the countries was predjudiced by the dearth of information available concerning import and production data. It would have made this study of more value could Germany, France and Italy, in particular, have been included, but the lack of immediately available statistical information regarding motor vehicle imports and exports of these countries, especially over a period of years, has prevented their use.

Addition of these three countries, each operating a large number of motor vehicles but with relatively few of

TABLE 1
Motor Vehicle Exports of Principal Producing Countries

	Total Exports	U. S. and Canada No.	%	Great Britain No.	%	France No.	%	Italy No.	%
1922	155,000	116,000	75	9,100	6	17,900	12	11,400	7
1923	278,000	222,000	80	11,900	4	31,000	11	12,800	5
1924	320,000	235,000	74	15,700	5	48,100	15	18,900	6
1925	510,000	386,000	76	29,100	6	61,500	12	29,000	6

TABLE 2
Total Motor Vehicle Sales in Selected Countries

	1921	1922	1923	1924	1925
Argentina	9,700	16,000	30,800	15,600	38,400
Australia	8,200	27,100	57,800	64,900	81,900
Belgium	4,700	15,700	15,600	15,200	21,800
Brazil	1,000	2,800	11,200	8,200	22,200
Cuba	2,000	2,100	7,500	9,500	10,300
India	4,000	4,200	11,300	11,200	17,400
Mexico	8,400	8,600	9,000	10,400	16,400
New Zealand	3,800	4,800	16,400	17,300	22,700
South Africa	2,100	5,300	13,200	13,500	20,800
Spain	1,100	4,300	11,600	13,500	16,300
Sweden	1,200	8,800	15,500	15,500	5,200
United Kingdom	40,000	56,900	78,100	130,300	163,900

TABLE 3
Estimated Motor Vehicle Production of Principal Producing Countries

	1922	1923	1924	1925
U. S. and Canada	2,659,000	4,087,000	3,618,000	4,337,000
Great Britain	52,000	72,000	134,000	220,000
France	75,000	125,000	145,000	177,000
Italy	18,000	20,000	35,000	40,000
Germany	46,000	35,000	18,000	70,000
Belgium	2,600	2,500	2,500	5,000

TABLE 4
Belgian Motor Vehicle Imports—Including Belgian Production

	Total Imports	From U. S. and Canada No.	%	From Great Britain No.	%	From France No.	%	From Italy No.	%
1921	4,700	700	15	30	..	2,100	45	400	9
1922	15,700	7,900	50	30	..	3,000	19	600	4
1923	15,600	9,200	59	20	..	2,500	16	800	5
1924	15,200	1,800	12	110	..	9,800	58	1,000	7
1925	21,800	7,600	35	40	..	8,400	39	700	3

American origin, might have changed the complexion of the results of this study, but it is possible that their influence would not have been of major character. This is borne out by comparing the ratios of American cars in operation during 1926 in these three countries in addition to the 12 mentioned before, with Japan added for good measure.

In the 12 countries used as a basis for the study there were about 1,989,000 motor vehicles in operation at the beginning of this year. This amounts to 43 per cent of the total motor vehicle population outside the United States. Adding to this figure the number of motor vehicles in Germany, France, Italy and Japan gives a total of 3,207,000, or 70 per cent of the total foreign automotive population. In spite of the fact that the proportion of American-built cars in Germany is estimated at only five per cent, and in France and Italy at only two per cent, the total proportion of American vehicles in these 16 countries falls to but 57 per cent from 60 per cent as applying to the 12 countries which provide the data used in the study.

In an investigation of this kind great difficulty is always experienced in obtaining reliable data. In no other country is there available such accurate historical data concerning motor vehicle imports, exports and production as is provided by United States agencies. The Automotive Division of the Bureau of Foreign and Domestic Commerce has made considerable progress in obtaining fairly reliable automotive statistics from many foreign countries and on material from this source much of this survey has been based.

In Table 1 are given total motor vehicle exports from the four main producing countries since 1922, the earliest year for which anything like complete data are available. From this table it is evident that American exporters have fairly consistently contributed about 75 per cent of total foreign shipments. The discrepancy between this figure and the previously mentioned ratio of our exports to additions to foreign motor vehicle population is caused by the fact that the latter figure takes into consideration foreign production for home consumption while the three-quarter ratio applies to actual shipments from the various producing countries.

From Table 1 there appears to have been no important changes in the relative positions of these countries. Great Britain and Italy each have provided about six per cent of the total export shipments each year while France has supplied 12 per cent.

TABLE 5
Spanish Motor Vehicle Imports by Countries of Origin

	Total Imports	U. S. & Canada No.	%	Grt. Britain No.	%	France No.	%	Italy No.	%
1921	1,100	500	45	80	7	....	..	480	44
1922	4,300	3,300	77	100	2	360	8	500	12
1923	11,600	7,800	67	100	1	3,000	26	730	6
1924	13,500	5,600	41	60	..	5,300	39	1,500	11
1925	16,300	8,000	49	300	..	7,000	43	1,200	7

TABLE 6
Swedish Motor Vehicle Imports by Countries of Origin

	Total Imports	U. S. & Can. No.	%	Grt. Brit. No.	%	France No.	%	Italy No.	%
1921	1,200	1,000	83	20	..	..	..	150	12
1922	8,800	4,100	47	90	1	150	2	130	2
1923	15,500	9,200	59	30	..	210	1	130	1
1924	15,500	4,500	29	20	..	180	1	450	3
1925	5,200	4,600	88	15	..	..	..	580	11

TABLE 7
Motor Vehicle Imports into Great Britain
(Including British production less exports.)

	Total Imports	U. S. & Can. No.	%	Grt. Brit. No.	%	France No.	%	Italy No.	%
1921	45,000	3,100	7	40,500	90	....	..	1,300	3
1922	67,600	14,700	22	42,900	65	6,100	9	3,900	6
1923	91,600	21,800	24	60,100	65	7,000	8	2,700	3
1924	145,000	13,800	9	118,300	82	8,100	6	4,500	3
1925	193,000	27,000	14	146,900	76	13,200	7	5,800	3

TABLE 8
Motor Vehicle Imports into South Africa by Countries of Origin

	Total Imports	U. S. & Can. No.	%	Grt. Brit. No.	%	France No.	%	Italy No.	%
1921	2,100	1,700	81	120	6	..	..	..	..
1922	5,300	5,100	96	100	2	..	..	..	..
1923	13,200	10,900	83	200	2	..	..	..	..
1924	13,500	10,600	79	700	5	..	..	..	..
1925	20,800	18,300	88	200	1	..	..	..	..

TABLE 9
Motor Vehicle Imports into India by Countries of Origin

	Total Imports	U. S. & Can. No.	%	Grt. Brit. No.	%	France No.	%	Italy No.	%
1921	4,000	3,100	77	600	15	15	..	200	6
1922	4,200	3,300	79	600	14	70	..	200	5
1923	11,300	9,700	86	800	7	140	1	500	4
1924	11,200	9,100	81	1,500	13	150	1	230	2
1925	17,400	12,600	72	2,300	13	400	2	900	5

Not So Strong in Europe

As might be expected, the American position in Europe, as indicated by data from the four countries included in Tables 4, 5, 6 and 7, is not particularly strong and has shown few signs of improvement during recent years. The location in this territory of all our competition in motor vehicle production together with the high tariffs which have been commonly provided to protect the home industries make Europe a particularly difficult field in which to sell American-built vehicles.

Despite these obstacles, however, in only one of the four countries—Great Britain—do we fail to take first place as the source of origin of the greatest number of imports. This would not hold true with the addition of the other large European motor vehicle operating countries, since but a very small proportion of the addition to the automotive population of France, Germany and Italy comes from this country.

It should be noted that the absence of export figures from certain countries in these tables does not necessarily indicate that there were no exports, but only that there is no information available concerning them.

American exports to South Africa have remained fairly constant through the five years covered, making up an average of about 85 per cent of the total imports. British exports are, apparently, the only rival in this market,

but information is lacking concerning the activities of France and Italy.

In India American exporters have held approximately 80 per cent of the market throughout the last five years and there is no apparent indication that this position will be greatly changed in the near future, although our 1925 ratio suffered a bit, mostly from the activities of Italian producers.

The position of American manufacturers in Australia and New Zealand has been maintained fairly well although our 1925 exports to the former country were, apparently, about five per cent below the average for the five years.

In New Zealand our 1925 export ratio was quite a bit above the five-year average but there has been so much variation from year to year in our relative success in this market that this fact can not be given too much importance.

The Brazilian market is being rapidly developed by American manufacturers and from the data shown in Table 12 Italy apparently is left as our sole competitor of importance in this country. Almost identical conditions prevail in Argentina, where the market for American motor vehicles has been developed greatly within the last few years.

Tables showing imports by countries of origin into Mexico and Cuba have not been shown since there is no real competition for American cars in either of these countries.

These data support the general statement made at the opening of this article—that American manufacturers are at least holding their own in the world markets and, in certain countries, are steadily improving their position.

TABLE 10

Motor Vehicle Imports into Australia by Countries of Origin

	Total Imports	U. S. & Can. No.	%	Grt. Brit. No.	%	France No.	%	Italy No.	%
1921	8,200	7,700	94	100	1	....	..	300	4
1922	27,100	24,700	91	160	1	800	3	1,400	5
1923	57,800	53,200	92	2,000	3	1,200	2	1,400	2
1924	64,900	58,600	90	2,300	4	1,600	3	2,000	3
1925	81,900	69,400	85	3,300	4	....	..	2,100	3

TABLE 11

Motor Vehicle Imports into New Zealand by Countries of Origin

	Total Imports	U. S. & Can. No.	%	Grt. Brit. No.	%	France No.	%	Italy No.	%
1921	3,800	2,100	55	....	..	150	4	80	2
1922	4,800	3,600	75	1,200	25	...	..	..	..
1923	16,400	14,600	89	1,800	11	...	..	..	..
1924	17,300	16,000	93	1,200	7	...	..	..	..
1925	22,700	19,200	85	2,700	12	200	1	200	1

TABLE 12

Motor Vehicle Imports into Brazil by Countries of Origin

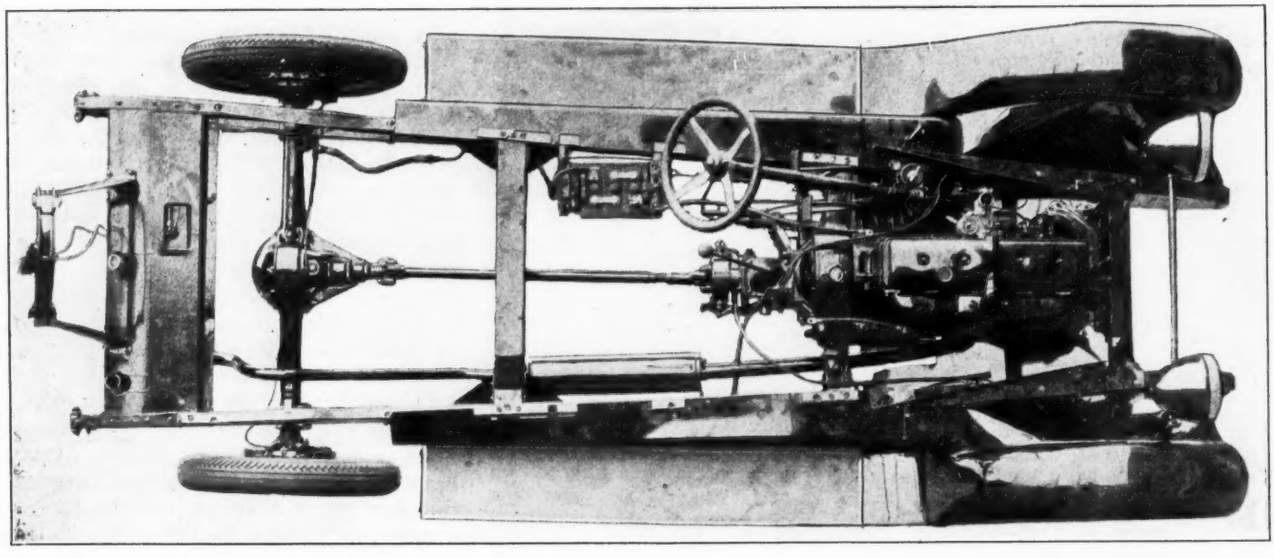
	Total Imports	U. S. & Can. No.	%	Grt. Brit. No.	%	France No.	%	Italy No.	%
1921	1,000	400	40	40	4	120	12	100	10
1922	2,800	2,500	89	60	2	50	2	160	6
1923	11,200	11,000	97	20	..	20	..	280	3
1924	8,200	7,600	93	10	..	110	1	520	6
1825	22,200	20,800	94	30	..	...	..	1,400	6

TABLE 13

Motor Vehicle Imports into Argentina by Countries of Origin

	Total Imports	U. S. & Can. No.	%	Grt. Brit. No.	%	France No.	%	Italy No.	%
1921	9,700	1,000	10	85	1	..	..	200	2
1922	16,000	4,700	29	30	..	..	..	200	1
1923	30,800	8,700	28	30	..	...	..	500	2
1924	15,600	14,700	94	40	..	220	1	500	3
1925	38,400	36,900	96	120	..	400	1	1,200	3

The Velie "50" Chassis



View showing general layout of the new Velie "50" chassis, which was described in last week's issue

Just Among Ourselves

Others See Advantage in Brighter Trucks

WE suggested once some time back that even in truck design somewhat greater artistry in color, in body lines, and so forth, might help materially in selling the vehicle. It's gratifying to get confirmation of the idea from no less authority than the Automobile Body Builders' Association, which says in a recent bulletin: "There is, for example, the matter of artistic and beautiful delivery wagon bodies. To a florist a beautiful body is certainly an advertisement of the first class. The same holds true in relation to other so-called luxury businesses. With the department stores keen to surpass each other, a considerable industry becomes apparent if salesmanship is used." All of which seems to us like sound stuff.

* * *

Business Goes Up in the Air

NOTHING is more apparent to the observer of the automotive industry than the transitory nature of ideals, standards, and business phraseology. To say of an executive that "He has his feet on the ground" in the past always has been considered among the highest of compliments, while to say of him that "He goes up in the air quite frequently" was to impugn seriously his abilities as an administrator. But now! The most solid, efficient and progressive of automotive executives are quite frequently up in the air. Tales of flights from one city to another for business purposes are common and our phraseology gradually will change to meet the new conditions. Ross W. Judson, president of Continental Motors, has gone everybody else one better, it seems, by using the airplane, not only as a means of traveling quickly about for business purposes, but also as a place in which business can be transacted en route. Mr. Judson, the aviation division of the Detroit Adcraft Club informs us, has a complete office fitted up in the cabin of the big three-motored Fokker plane in which he makes regular trips between Detroit and the Continental factory at Muskegon, and also to Chicago, Cleveland, New York and other cities. The plane makes two or three trips a week and is equipped for business just as is the private car of a railway official. A dictaphone with other office equipment has been installed and the inside of the cabin looks like this:

* * *

How Many Companies Are Building Eights?

HOW many American manufacturers are building eight-cylinder cars? Can you answer that off-hand? What's your guess? We had occasion to check the list a few days ago and were surprised at the result, despite the fact that we are supposed to have a reserved seat in the press gallery of the industry and to be so well informed as to be able to give instantly the name, age and trade-in value of the car which stopped for gas at 6 p. m., Tuesday, in Pike County, Arkansas. After making our check, and without revealing the result, we asked several of our scrivener associates to make guesses. They were all low. The number was 19. In the meantime one company included in the list has announced that its eight has been discontinued, but we happen to know that two new ones will appear soon, so the number around New York show time probably will be 20.

* * *

New Names on Program for Transport Congress

THE World Motor Transport Congress seems to have become established as an annual event in connection with New York show week. There was some talk last winter of having this third congress held in England, but here it is back in New York again looking fresher and more interesting than ever. Several other countries have held motor transport congresses in the last year or so, and are expected to do so in the future. These smaller conferences will aid materially in stimulating motor vehicle interest in various sectional areas and will help to develop better selling and servicing methods. The program for the big conference in New York next January bears a number of names made familiar to our foreign visitors through the two previous congresses. Col. Clifton, John Willys, Roy Chapin, Edward S. Jordan, H. H. Rice and other important executives will be back to bring new messages to the gathering. Among the new faces on the speakers' platform will be Edward G. Wilmer, the new Dodge Bros. chief, and Lawrence P. Fisher, the Cadillac boss, thus indicating that the newer administrative heads in the industry as well as the older ones are taking a deep and active interest in the problems of export as well as domestic trade.—N. G. S.

Metal Playing More Important Part in British Bodywork

Austin only car thus far produced, however, with body made entirely of steel. New sedans are designed on more attractive lines. Sliding roof introduced.

By M. W. Bourdon

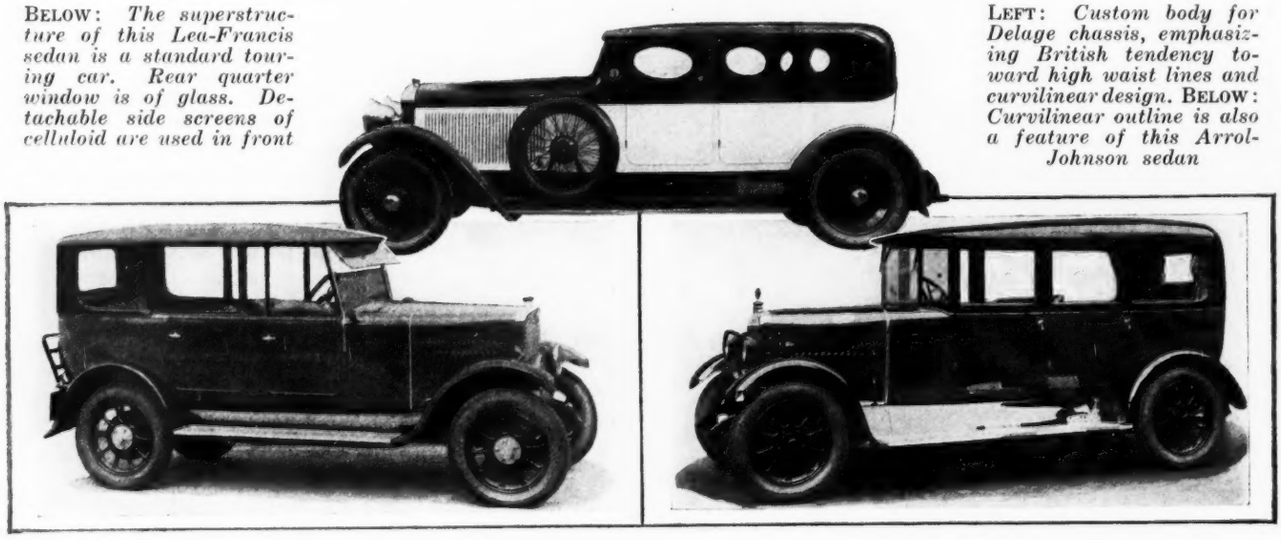
ONLY Austin among British makers has adopted a metal body construction and it differs from the usual American all-metal body (Dodge, Essex, etc.), because the elaborate pressings made possible by outputs on the American scale are not a practical proposition in British plants.

Austin uses many small and simple pressings, but rolled steel stock is largely in evidence, with riveted or bolted-on gussets where integral units would be used if more elaborate pressings were justified. Separate panels, aluminum or steel, are used, except for the wheel arches which form part of the foundation framing.

Although Austin is alone among British makers in adopting anything approaching an all-metal body, many others are using metal to a far greater extent than before. It is improbable, however, that development in the use of metal for bodywork will go so far as in America, unless British outputs increase to an extent that appears out of the question now.

BELOW: *The superstructure of this Lea-Francis sedan is a standard touring car. Rear quarter window is of glass. Detachable side screens of celluloid are used in front*

LEFT: *Custom body for Delage chassis, emphasizing British tendency toward high waist lines and curvilinear design.* BELOW: *Curvilinear outline is also a feature of this Arrol-Johnson sedan*



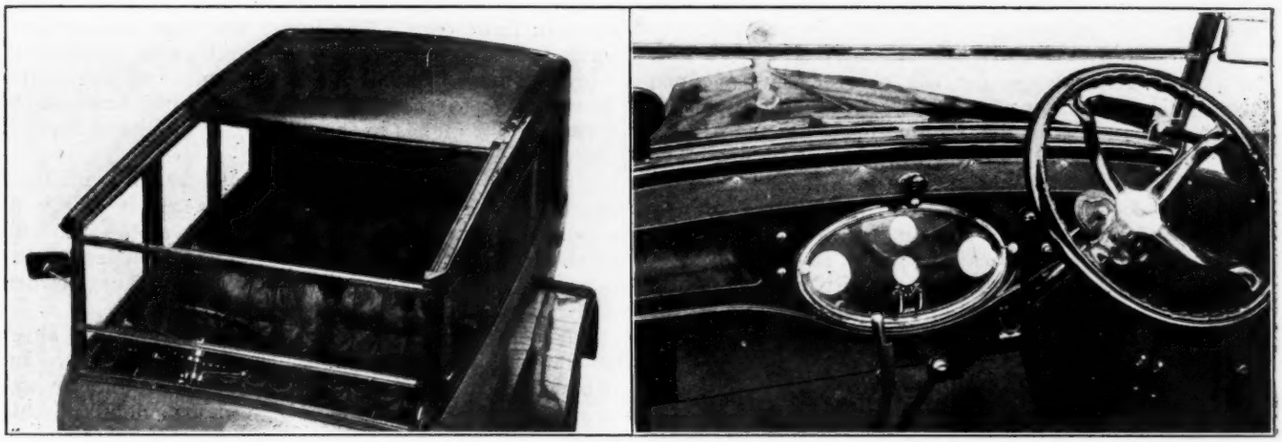
Weymann Has New Plant

Fabric bodies of the fully flexible (Weymann) type have not made any headway in England, so far as stock bodies are concerned, though custom-body builders supply a fair number and Weymann has recently organized a British plant for producing custom bodies and a standard range for certain makes of British chassis. But most British car makers list a so-called fabric sedan body, which is usually a rigid-framed construction and has aluminum panels as high as the waistline.

Stock sedans generally have been improved in appearance by the further elimination of straight lines and rectangular rear quarters. Where this has been done the increased production cost of the curvilinear design frequently has prevented reduction in prices, but there is reason for believing that the policy of providing a better looking car at the 1926 price will be justified.

Some of the low priced sedans are not less attractive in design than the much higher priced jobs, the roof having a continuous curve from front to back and merging into the rear panels with a pronounced sweep, while the rear corners are formed to a wide radius emerging from a rear panel curved in plan as well as in side elevation. The general appearance of the car has been improved in some cases, too, by the cowl having been given a continuous curve from side to side, and by the adoption of a higher radiator and hood.

There is a distinct tendency toward a rectangular effect in the front aspect of radiators. Morris, in adopting a radiator reminiscent of Rolls-Royce, in



LEFT: *This unique method of obtaining touring car visibility for a closed car is a feature of the new Standard Six.* RIGHT: *Morris fits an all-steel dash and instrument board and provides recesses on either side of the latter for small parcels*

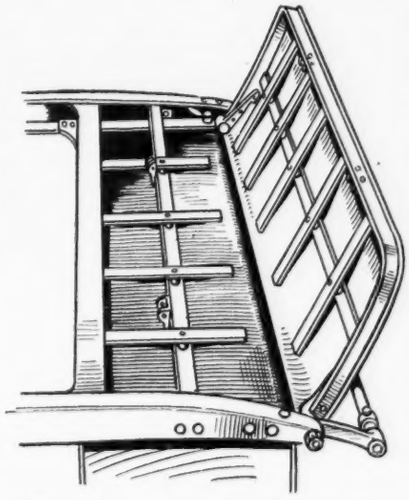
place of the V-fronted, sloping pattern previously used, has gone farther than most in this respect, making the appearance of his cars entirely unfamiliar. The design of the entire range of bodies has been varied as well, to suit the new radiator and hood.

A development in sedan construction lies in the use of the stock open body as the foundation for the superstructure, the "shells" of sedans and open models being practically interchangeable, and progressing indiscriminately up to a late stage on the open body erecting line. Any open body at that stage can be taken to the sedan line and have the top fitted, though the doors may differ from those for the sedan, being designed for drop windows. Obviously this is of advantage from a production aspect. The tops are not demountable and once the sedan is completed it must always remain a sedan.

Demountable top sedans are not now being offered by British car makers, though several appeared at Olympia, exhibited by Italian and Austrian firms, one having a top built on Weymann lines with removable glasses over the doors. Rover, however, offers a demountable head coupe on the 9-20 hp. chassis and supplies with the standard equipment a folding mohair top for use on the car in its open form.

An innovation in respect of stock sedans is represented by the sliding roof model of Standard cars. This is a feature introduced at the 1924 Olympia Show by a custom-body builder who is also a dealer in Standard cars. The front half of the roof slides back over the rear portion in a recess formed by edges of the roof and viewed, from the sides, front or rear, there is nothing unorthodox in the appearance of the body. The sliding portion is operated from the driver's seat; it can be moved to any one of a number of different positions and locked there by means of double bolts actuated by the handle grip used to move it.

One or two other makers besides Standard are offering a touring saloon. In one case this differs but slightly from the normal sedan, though it has two doors instead of four and is a lighter construction. But in another case the ordinary open car has a sedan top permanently fixed to it but with glass windows at the rear quarters only. From the back of the rear doors to the driving screen, framed celluloid side screens are used in place of drop glasses, these side screens being detachable in the usual manner.



Hinged cover for fuel tank is also used as luggage platform on new Talbot Six

Limousine Displacing Sedan

In the higher priced cars the enclosed limousine is displacing the sedan, owners objecting to a chauffeur being seated in a single compartment body. A good many examples of these enclosed limousines have almost full-width drop glasses forming the division between the front and rear compartments, while in a number of custom bodies the whole of the division glass and side frames can be either lowered or removed completely to turn the car into a sedan when the owner drives unaccompanied by a chauffeur.

The pillars of sedans and other closed custom-built cars are smaller in section than hitherto, this being brought about mainly by the use of metal reinforcement for the wood of which the pillars are formed. In one case the pillar between the two doors is invisible from outside the car when the doors are closed, for it is beveled off to a fine point as viewed sectionally in plan.

The majority of British automobile manufacturers still refrain from adopting cellulose finish, though it is used by several of the most important firms, such as Standard, Armstrong-Siddeley and Austin. Morris has not yet adopted it, but is believed to be continuing investigations into its possibilities. In several cases where cellulose is used for the open cars, paint and varnish are still standard for sedans. Many custom-body builders are using cellulose and are giving it a gloss equal to varnish finish.

Where cellulose has been adopted there is a tendency to eliminate the mouldings of door panels and elsewhere, to avoid trouble due to flaking and cracking at the junctions with the panels. The latter are now being turned over the edges of the door and body

frame, instead of being cut off flush and fitted with beadings and mouldings.

Narrow and extremely neat metal frames are now in almost general use for the side screens of open cars. These screens are still detachable in most cases, but Humber and Standard make them to lower into the doors, while Austin hinges their lower edge to the door tops and makes them to fold down inside, with a leather flap concealing them when out of use.

Several makers who still use demountable side screens are providing locking sockets in the body rail. Some of these are locked by an eccentric fitting, while others have a finger-operated pinch-bolt. Storage for demountable side screens is generally arranged behind the back seat.

Draught-Proof Screens

Beyond the provision of inner valances for the folding top there is no provision, with one or two exceptions, for excluding the draught that is prone to enter over the tops of side screens; but in a few instances there is a rigid abutment for the latter. The Wolseley folding top, for example, has a rigid cantrail running the full length when open, and this, with rubber sealing strips, forms a firm and draught-proof abutment for the side screens. The Standard top has a similar arrangement but without the rubber.

Nearly all British cars, open and closed, now have adjustable front seats, the majority also being separate. It is to be feared, however, that many of these separate adjustable seats are not so comfortable as the fixed and single unit types they have displaced. They have insufficient curvature of the backrest to prevent the occupants tending to "roll" at corners, and in the absence of upholstery padding on the narrow door pillars at each side, and on the doors themselves, positive discomfort, if not bruises, may be experienced on long runs owing to the elbows of the driver and his companion constantly bearing and striking against the wooden or metal pillars.

Spring blinds for the rear windows are operable from the driving seat in several stock sedans for 1927; Hillman among British makers introduced this feature last year, the spring-roller blind being at the bottom of the window and actuated by a cord passing over rollers to the side of the driver.

Armrests at the side of rear seats of sedans are becoming normal and in some cases a central spring-up armrest is fitted as well. On one body at Olympia the front passenger and the driver were provided with armrests on the outside, hinged so as not to impede entrance or exit.

Standard Increases Headroom

Standard, alone among British makers, has increased the headroom of both sedans and folding tops, though the 1926 models were by no means as low as many. The additional height is used to increase the window area. Daimler bodies have appreciably higher waistlines than hitherto, the roof height remaining as before; this reduces the window area, but that is claimed as an advantage by giving increased privacy without restriction of view.

There is a tendency to eliminate the severely rectangular effect of sedan rear quarter windows. Conforming with the curves of the rear end of the roof, the top and bottom corners of the glasses are well rounded.

Rear seat widths are increased in many cases. There is deeper paddle-boxing of the wheels, and the bulge inside is used as the foundation for armrests. Seat widths of 50 in. are not unusual and run up to 52 in. even in light cars. The latter are now usually five-passenger types in reality as well as in name, and more legroom is available in a number of instances. Morris, Standard and Swift, for example, have added three or four inches to the wheelbase and have devoted the extra length to body space.

Austin in his new six has gained about 3 in. body space, with no more overhang on a given length of wheelbase, by putting the timing gears at the rear end of the engine, with a crankshaft bearing at each side of them. This puts the cylinder block farther forward and the dashboard follows suit.

All-metal dashboards are increasing, though sheet steel facia and instrument boards are unusual. Indirect lighting for the instruments is found on approximately a half-dozen new British models and this scheme in one form or another promises to develop. Cubby holes (recessed shelves in the facia board for small parcels) are now a feature of most British cars.

Single-panel front screens have appeared for the first time in British practice, though the two-panel with a hinged top half is still by far the most widely used. A rubber sealing strip is generally fitted to the overlapping lower edge of the top panel. Where a single-panel screen is provided it is hinged at the top and no British maker has adopted the vertically adjustable or the swinging panel giving indirect ventilation.

Splinterless Glass

Splinterless glass of three different makes is now available in England, after having been the product of one firm exclusively (Triplex) for many years. It is not yet fitted as standard equipment to stock cars, but is widely used by custom body builders.

Leather upholstery is by way of becoming standard in sedans. It is already so in many cases, though cloth is sometimes offered at option. In a few instances the front seats are upholstered in leather and the rear ones in cloth, while elsewhere the upholstery is leather with cloth lining for the superstructure. Even custom-body builders of expensive cars are fitting leather upholstery in the majority of their products.

Pneumatic upholstery has made practically no headway in stock bodies. Only one British maker (Rhode) has adopted it and it was seen only on three or four custom bodies at Olympia. The seats and backrests of stock cars have, nevertheless, been improved in comfort. Pleated upholstery covering in place of plain has encouraged that effect in several for cushions and backrests, two series of coil springs, instances, and a few makers are using dual springing the upper series extremely flexible, being the usual arrangement.

ACCORDING to a recent report from the Department of Commerce, during the first six months of 1926 a total of 3,129,499 automobile casings were exported from the six leading producing countries. Of this total France contributed the largest share—899,535 or 28.7 per cent; next came the United States with 799,291 or 25.5 per cent of the total; Canada with 549,563 or 17.6 per cent; United Kingdom with 400,547 or 12.8 per cent; Italy 340,630 or 10.9 per cent, and Germany 139,933 or 4.5 per cent.

The report in which these figures are contained also shows that the ratio of United States tire exports to total exports has decreased from 27.4 per cent in 1925 to 25.5 in 1926.

Continental Engineers Discuss Single Sleeve Valve Design

Problems entering into construction and operation covered in paper prepared under direction of Chief Engineer W. A. Frederick and presented before Metropolitan Section, S.A.E.

THE engineering problems entering into the design of the single sleeve valve type of automobile engine were discussed in detail in a paper read before the Metropolitan Section, Society of Automotive Engineers, at the Hotel Woodstock, New York, Monday evening, Nov. 15.

The paper had been prepared by Chief Engineer W. A. Frederick of the Continental Motors Corp., and his staff, and was read by Lewis P. Kalb, assistant chief engineer, in Mr. Frederick's absence.

The meeting proved to be one of the largest in attendance ever held by the Metropolitan Section. Engineers from many engine-manufacturing concerns were present, and the various points of interest in the engine design were fully illuminated.

All admitted that the single sleeve valve engine possessed excellent features, and the general consensus of opinion seemed to be that after the problems of its design for quantity production had been fully solved it would become an important factor in the motor car field.

A. M. Niven, the British engineer who has charge of single sleeve valve engine development work at the Continental plant, was present and replied to questions asked during the discussion. The paper in a somewhat abbreviated form follows:

In 1911, after about two years of research work, Argylls, Ltd., of Alexandria, Scotland, announced the introduction of a chassis equipped with the Burt-McCollum engine. The car immediately found a ready sale, aided, no doubt, by the public's appreciation of the pioneer work of C. Y. Knight whose double sleeve valve engine had been in production by the Daimler Motor Co., Coventry, England, for over two years.

History of the Engine

During the years 1909 to 1914 Argylls, Ltd., held a monopoly on the single sleeve valve engine and manufactured it for their exclusive use. About a month before the War, the Argyll concern had the misfortune to be placed in receivership, with the result that, according to agreement, the patent rights reverted to Peter Burt, the inventor.

Work on the engine was practically at a standstill during the war years 1914 to 1918, but soon after the Armistice the patents were purchased outright by Wallace (Glasgow), Ltd., who placed on the market a series of stock automobile engines, and granted licenses to other companies for the manufacture of industrial, marine and motorcycle engines, both air and water cooled.

Last year the Continental Motors Corp. obtained the world's rights to manufacture and license the single sleeve valve engine under the Burt-McCollum patents.

It may not be out of place to comment briefly on the patent situation. Burt's original patent was filed on Aug. 6, 1909, and accepted on Aug. 8, 1910. A four-years' extension was granted last year, so that the date of expiration is Aug. 5, 1929. Application for an equivalent United States patent was filed on Aug. 3, 1910, and granted on July 22, 1919, thus giving an expiration date of Dec. 3, 1936. Perhaps the broadest claim contained in the United States patent is that which reads:

> A mechanism for the purpose specified, comprising a main cylinder having intake and outlet ports near its head, a piston enclosing cylinder movably fitting within said main cylinder to act as a valve and having intake and outlet ports, and movable for bringing the respective ports into alternating registering relation therewith, a piston reciprocating within said enclosing cylinder, and means for imparting synchronous longitudinally reciprocating and oscillating movement to said piston-inclosing cylinder, the range of longitudinal movement being less than the piston movement and greater than the longitudinal dimension of the ports.

McCollum's patents which were assigned to Argylls, Ltd., and others, cover the arrangement of a sleeve outside of the main cylinder instead of between the cylinder and piston, and two operating mechanisms for imparting the reciprocating movement to the sleeve.

The design of mechanism for actuating the sleeve is an interesting problem and many schemes have been tried out; however, all things considered, the gear type of drive in various forms has proved the most satisfactory. Some of the drives in use are shown in Fig. 1.

At *a* the original Argyll type is given. It employs skew gears to transmit the drive from the valveshaft to the sleeveshaft. On the inner face of the sleeveshaft a hole is bored parallel to, and at a definite distance from, the shaft axis. Into this hole the actuating pin is entered, the head of the pin being machined with flats to form a hinge connection with lugs at the base of the sleeve by the aid of a pivot pin. The actuating pin is free to oscillate in the sleeveshaft hole and so compensate for the variation in the distance between

the centerline of the sleeve and the axis of the hinge pin during operation. This mechanism works satisfactorily, but is somewhat heavy and costly, partly owing to the use of ball bearings and ball thrusts.

The second type shown *b* was used by Piccard-Pictet et Cie. of Switzerland, for many years. This gives a rigid and practically wearless mechanism, but has the disadvantage of being much too heavy, the placing of the sleeve lugs between the cylinders adding considerable length to the engine. Two valveshafts are employed; one at each side of the engine. These run at half engine speed and are identical, taking the form of small throw crankshafts, having a throw for each cylinder. The throws are connected by means of a cross link, one end of which is floating to allow for slight inaccuracies in synchronism. At the center of the link, connection is made with the sleeve by means of a hinge joint as at *a*. It would seem that this type of drive is best suited for extra large engines of the bus type. The cross link could be made of duralumin or other light alloy.

A modification of type *b* is shown at *c*. This is known as the link drive and was first used on the 1919 model Argyll "Mark A" engine. It is lighter and cheaper than type *b*, but obviously inferior mechanically. The necessary lengthening of engine is a disadvantage as is also the fact that, as with type *b*, the driving mechanism must be assembled in position in the crankcase. An advantage which should not be overlooked is the coupling effect of driving each sleeve from a common valve-crankshaft.

The present sleeve driving mechanism is shown at *d*. This, it will be seen, is a modification of the original type *a* drive. Introduced in 1921 in the "Mark N" engine, it has given entire satisfaction. The adoption of a universal ball and socket connection has many advantages; it is lighter, occupies less space, and allows for any inaccuracies in the alignment of parts. The distance from the cylinder axis to the center of actuation is less than in any previous drive, thus giving a smaller sleeveshaft stroke for a given area of port opening.

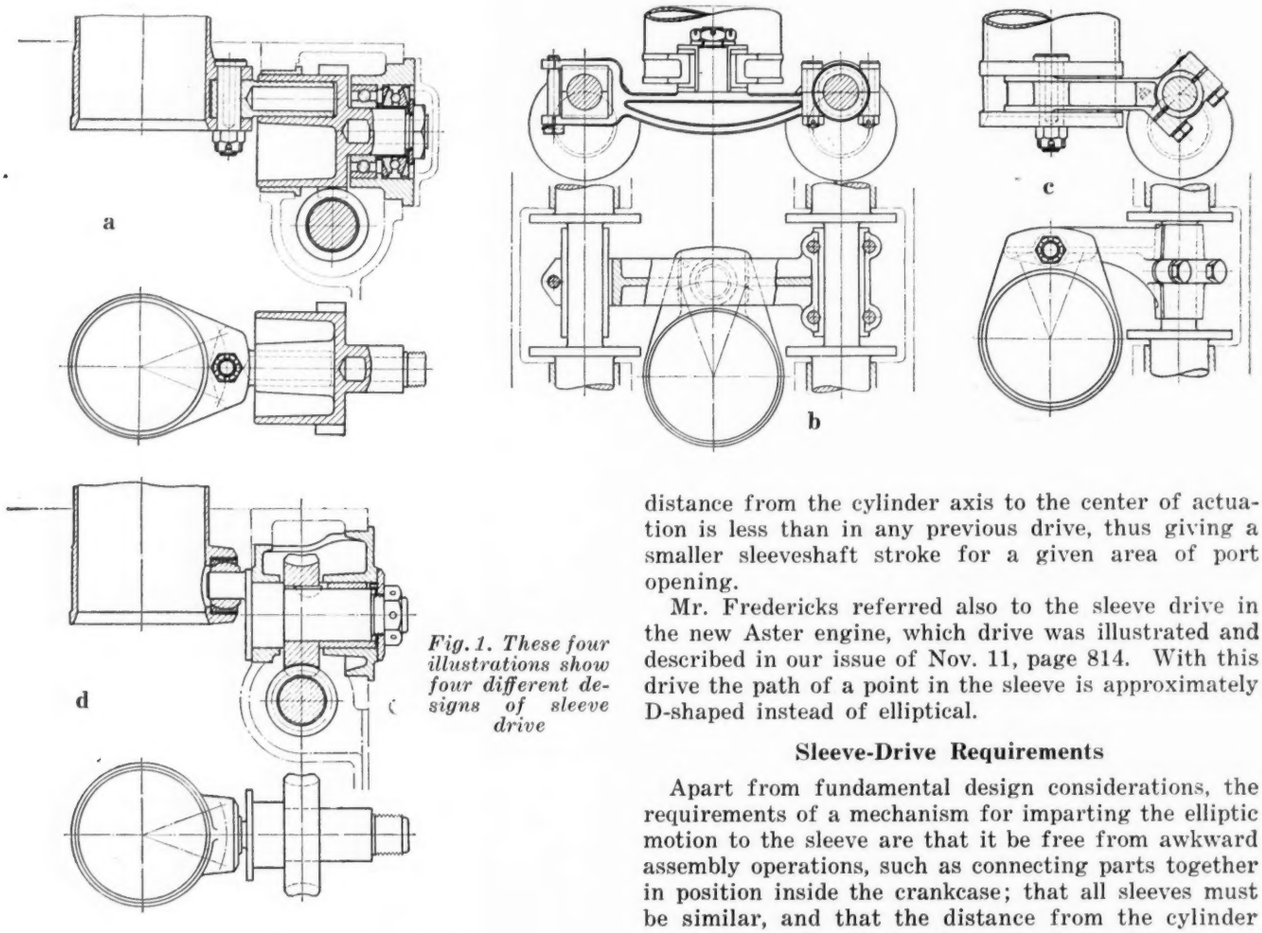


Fig. 1. These four illustrations show four different designs of sleeve drive

Mr. Fredericks referred also to the sleeve drive in the new Aster engine, which drive was illustrated and described in our issue of Nov. 11, page 814. With this drive the path of a point in the sleeve is approximately D-shaped instead of elliptical.

Sleeve-Drive Requirements

Apart from fundamental design considerations, the requirements of a mechanism for imparting the elliptic motion to the sleeve are that it be free from awkward assembly operations, such as connecting parts together in position inside the crankcase; that all sleeves must be similar, and that the distance from the cylinder axis to the point of actuation must be a minmum.

The sleeveshaft and worm wheel in type *d* are built up as a unit in a bearing housing, the outside diameter of which is eccentric to the bore in order to facilitate assembly. It will be noticed that the gears run in a constant level oil bath.

The characteristic twisting movement has many inherent advantages. Although primarily conceived for the purpose of obtaining the proper sequence of valve operation when using one sleeve instead of two, it has proved a decided benefit in other respects. It is a natural lubricating motion, the oil being rolled evenly over the entire sleeve surface, and not localized and sheared, as in the case of a sleeve or piston having a reciprocating movement only. Oil grooves are not necessary on the surface of a single sleeve valve.

The sleeve movement approaches harmonic motion, and does not call for the sudden reversal of direction of travel with its attendant inertia loading, as does a sleeve with true reciprocating movement.

Again, the twist dissipates the heat loss to the sleeve wall over a larger area, giving more even temperatures and reducing distortion to a minimum. During the compression and power strokes, when the sleeve is subjected to the greatest pressure, it is moving with the piston, and the sleeve ports are protected between the water-cooled surfaces of cylinder and cylinder head.

It has not been found necessary to fit a sealing ring to the cylinder head, as used in the double sleeve valve engine. This is no doubt due to the baffle effect caused by the twisting movement which smooths out minute surface irregularities.

The fact that piston and sleeve move in the same direction at different speeds during pressure strokes results in a considerable reduction in piston rubbing speed, compared to that of a conventional poppet valve engine, and so reduces piston wear. The wear of the sleeve surface is practically negligible. It will be noticed that the sleeveshaft crank is near the 90 deg. position at the time of intake closing and exhaust opening, so that the sleeve is moving with the maximum velocity and practically in a vertical direction, therefore giving the desirable quick opening and closing of valve ports.

Sleeves Usually Cast Iron

Sleeves are usually made of cylinder cast iron, cast in a rotating mold, although ordinary sand castings are entirely satisfactory if carefully made. The wall thickness of the sleeve really is governed by what the machine shop can handle without fear of breakage. This will be found ample for strength under working conditions. In practice the wall thickness ranges from 5/64 in. for 2¾ in. bore to 9/64 in. for 5 in. bore.

Steel sleeves are sometimes used when high engine speed is desired. It is usual to manufacture them from solid drawn steel tubing, the boss for the actuating ball being formed by extruding operations. A sleeve of average diameter is fitted to the cylinder bore with a tight 0.003 in. and a slack 0.002 in. feeler.

The ball socket connection has evolved from a self-aligning ball bearing to the present sphere zone, having a pressure die-cast babbitt socket cast in position. The diameter of the sphere zone is generally made 0.35D while the sleeveshaft crank pin approximates 0.19D, where D equals the outside diameter of the sleeve.

A detachable head per cylinder has the advantage of obviating the use of a large casting and gasket. Any cylinder may be examined without disturbing the joint of the remainder. Explosion balance is assured, as the combustion space is completely machined, while the spark plug is ideally placed and effectively water-cooled. Cast iron is usually employed, although aluminum is satisfactory and is used where weight is of first importance.

Many shapes of combustion chambers have been tried, and although the hemispherical type is theoretically ideal, it does not prove in practice to be as good as the cone frustum type. The head is made a light push fit in the sleeve, and secured by four cap screws, an extra thin gasket being interposed between the head flange and cylinder. It should be noted that the head joint is not subjected to direct explosion pressures.

In common with other sleeve valve engines the power output improves as carbon builds up around the head. A standard spark plug is used.

No Freezing Troubles

Freezing troubles have not been experienced in connection with the cylinder head, although at first sight this would appear a probable source of trouble. A syphoning tube is sometimes fitted. Due to the shape of the combustion chamber it is possible to adopt a comparatively higher compression ratio without fear of detonation, 5 to 1 being generally used on automobile engines.

The size and shape of ports are determined by the area and valve timing required, in common with the poppet valve. These can only be settled by experience, each particular type of engine being considered according to the performance required of it.

Maximum area with minimum travel is obtained by using an L-shaped port, but, apart from machining difficulties, such a shape is impracticable owing to interference between sleeve and cylinder ports on the downward stroke of the sleeve. This interference is overcome by rounding off the corners of all ports. In order to simplify the machining of the port-cutting cam, it is usual to modify the port outline to give straight edges which results in a slight reduction in area for a given sleeveshaft stroke. The radius at the corner of the port is usually made ⅛ in., this being considered as small as possible consistent with cutter upkeep. The back edge of the port need not be vertical, but may be curved to conform with the path of travel.

The number of ports incorporated in the design of engines of different types ranges from two intake and two exhaust, to four intake and four exhaust. Taking a given area, the fewer the number of ports, the greater will be the degree of filling, but the fewer the ports, the greater is the sleeveshaft throw required; so, as in many other engineering problems, a compromise is made. Three intake and two exhaust ports have been found to be the best all-around combination for automobile engines. This arrangement gives a moderate sleeveshaft throw and practicable water cores between the ports in the cylinder, while the maximum port opening area obtainable compares favorably with good poppet valve practice, a condition which has proved satisfactory for average engines. A typical valve opening diagram is shown in Fig. 2. This shows the quick opening and closing, also the decided "dwell."

A sleeve valve port will admit more air in a given time than a poppet valve of equal area, which is due to less heating of the intake charge and less restriction and friction. This is borne out in the volumetric efficiency tests contained in a paper on "Sleeve Valve Engines" by E. B. Wood, in which it is shown that under equal conditions the single sleeve valve engine has at least 20 per cent better volumetric efficiency than a poppet valve engine. Tests were made with a straight-through carburetor without external heat (Fig 3).

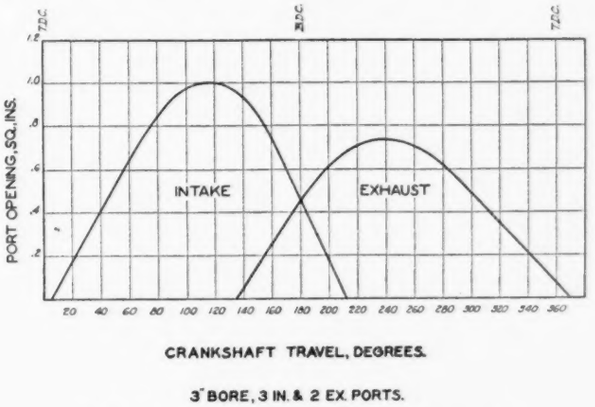
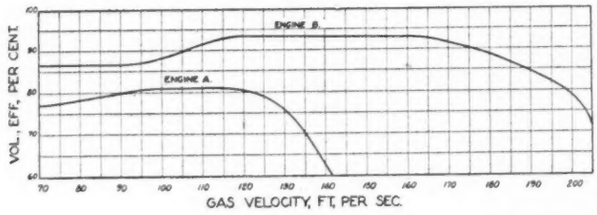


Fig. 2. Typical valve-opening diagram

Another point to be noted is that in a single sleeve valve engine the brake mean effective pressure does not fall off until a gas velocity of 110 ft. per second is reached, whereas in the case of a poppet valve engine, the falling off takes place in the region of 60 ft. per second. This is shown graphically in Fig. 4 where curves of several modern poppet valve engines are



ENGINE	TYPE	BORE, INS.	STROKE, INS.	CAPACITY, CUBIC INS.	NORMAL COMP. RATIO	EFFECTIVE COMP. RATIO	SPECIFIC INLET AREA IN² PER IN³	INLET CLOSES LATE	STRAIGHT THROUGH INTAKE UNHEATED
A	OVERHEAD POPPET	2.48	4.72	22.8	4.7	3.95	.0557	52	
B	S.S.V.	2.756	3.86	22.29	4.0	3.65	.0457	35	

Fig. 3. Volumetric efficiencies of engine with poppet and single sleeve valve of equal opening area

plotted against the latest single sleeve valve engine.

The valve timing on a single sleeve valve engine is positive irrespective of engine speed, so that it has to be considered from a somewhat different viewpoint than that of poppet valve timing. In common with poppet

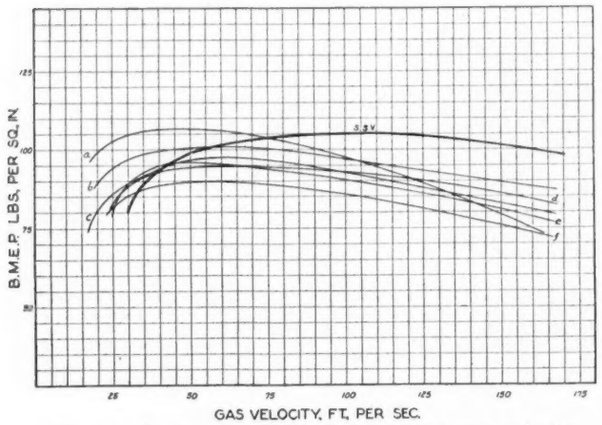
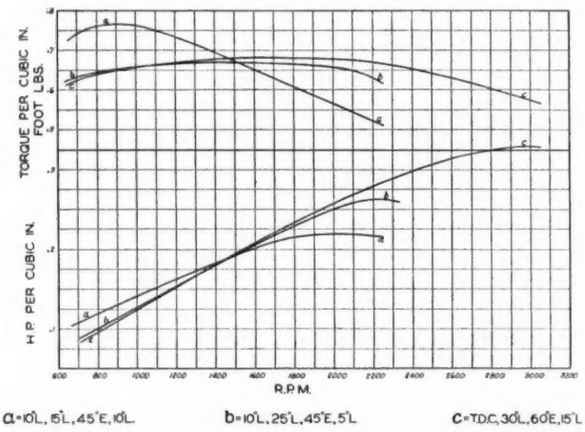


Fig. 4. Brake mean effective pressure-gas velocity curves for a number of poppet valve and a single sleeve valve engine

valve engines, the timing varies according to engine requirements. Average single sleeve valve practice is as follows:

Type of Engine	Intake Opens	Intake Closes	Exh. Opens	Exh. Closes
Low Speed	10L	15L	45E	10L
Medium	10L	20L	45E	10L
High Speed	5L	30L	60E	15L
Timing Tolerances Allowed on Production	2E to 5L	4E to 4L	4E to 4L	5E to 2L



a=10L, 5L, 45°E, 10L. b=10L, 25L, 45°E, 5L. c=TDC, 30L, 60°E, 15L

Fig. 5. Horsepower and torque curves of single sleeve valve engines with different valve timings

Fig. 5 shows the power output per cubic inch of three engines having valve timing as given in the table. The engines from which curves were taken differed in some respects so that an absolutely true comparison of effect of timing only is not presented.

The chief advantages of a single sleeve valve engine are sustained operating efficiency, good power output, and silence in operation.

A 1000-hour test run under full load at 2000 r.p.m. was recently made on a six-cylinder 2⅞ by 4¼ in. engine. During the first 100 hours the power output gradually built up to 44 b. hp., after which it remained constant until the completion of the test. Measurement of sleeve-driving-gear back-lash was made by means of an extended arm attached to the sleeveshaft, and although a maximum increase of 0.017 in. on the pitch line was recorded, the gears ran as quietly as at the start of the test. On dismantling the engine it was found that the maximum wear on the piston skirt was 0.001 in., while the wear on the outside diameter of the sleeve was undiscernable.

Valve Grinding Obviated

The adoption of a sleeve valve obviates such things as "grinding in" of valves, ingress of unwanted air through worn valve guides, valve distortion or sticking, clearance adjustment, valve spring breakage and frequent decarbonizing.

The rapid opening of ports, the type of port opening obtained, positive timing, unobstructed intake passages, and increased compression ratio all contribute to good power output.

Silence in operation is achieved by avoiding the hammer and anvil blows of a poppet valve, and the fact that the valve actuating mechanism does not extend outside of the engine body. The sleeve valve engine not only can be made to run quietly, but it stays quiet.

The weight of a single sleeve valve engine compares favorably with that of a poppet valve. When a separate cylinder block is used, the added depth of engine body due to the shortness of a sleeve valve cylinder gives strength and rigidity and allows the use of aluminum. A cast-iron sleeve for an engine of 2¾ in. bore weighs about 2 lb., while the weight of valves, springs and tappets for a poppet valve engine of even bore approximates 1¼ lb., a saving of ¾ lb. per cylinder in favor of the poppet. It should be borne in mind, however, that the sleeve valve cylinder head construction is considerably lighter than that of the poppet valve. In practice it is found that a single sleeve valve engine of average bore, with an aluminum casing, is about 50 lb. lighter than a poppet valve engine with the conventional cast-iron construction, other things being equal.

The paper quoted at length from the report of the Engine Sub-Committee of the British Aeronautical Committee for 1925-6, in which the opinion is expressed that these engines offer definite advantages for use in aircraft. An appendix illustrating the calculation of the port dimensions and locations was also included in the paper.

AUSTRALIAN distributors of an American motor car have placed an order with Holden's Motor Body Builders, Ltd., of Adelaide, for open and closed bodies valued at £750,000 a report to the Automotive Division, Department of Commerce, states. It is one of the largest contracts of its kind let in Australia, and covers body requirements on that make of car throughout Australia for a year.

*U*sed *C*ars *S*till *G*iving *D*ealers *M*any *A*nxious *M*oments

Situation continues serious and shows few signs fundamentally of getting better. Profits too low for volume of business.

By Norman G. Shidle

USED cars, used cars, used cars, used cars . . . Every time one contacts with the wholesaling or retailing end of the automobile business for a few days, he finds this single note continually sounding behind the business talk of distributors and dealers. With the rhythmic monotony and irritating persistence of a tom-tom at some native rite in darkest Africa, the words "used cars" seem continually to reverberate in the merchandising background of the industry. And with the sales drop of the last few weeks, its monotone has grown in volume.

Existing stocks of used vehicles in dealers' hands may vary from time to time; sales may be stimulated here and there for certain periods; factories may add field men and more field men to help dealers handle their used car problems, but still every new foray into conditions and opinions among distributors and dealers brings almost always the same note.

True, dealers are thinking about other things than used cars at the present time, but in talking about those other things they almost always link up the used car in their discussion. Within the last few weeks, for example, six successful, profit-making distributors for standard lines wrote us confidentially their ideas about 1927 business prospects, their satisfaction or dissatisfaction with 1926 profits as related to capital invested and turnover, and about several other points pertinent in the current distribution scheme. The six were scattered pretty well over the country. Detroit, Chicago, Denver, Salt Lake City, Cleveland—all these cities were represented. The opinions expressed related to the entire territories covered by these men and not to their personal business alone.

Profits Aren't Satisfactory

In this small but representative group, it would appear that profits this year have varied somewhat according to individual cases, but that hardly anyone is satisfied with the profit made as related to the volume of business done. And all are agreed that the used car situation still is serious and shows few signs fundamentally of getting any better.

One of the group does say as regards profit returns that, "Our net profits this year will represent a very satisfactory percentage of sales and likewise a good return on invested capital." He adds, however: "I believe that there are at least three big distributing organizations in our territory which could not make the same reply." The other five feel—one or two very strongly—that the net profit to be obtained in relation to volume done is much too small.

The average dealer, of course, still feels that the only basic solution to the used car problem lies in reduction of factory output and many of them are appreciative of the reduced pressure which their factories have applied in the last year or two. There is a good bit of evidence to indicate, nevertheless, that pressure of no mean proportions has been applied by some factories in the last few months and reports from some dealer areas indicate that the retailers have been forced into trading of an unusually unprofitable character in an effort to handle a sufficient number of new cars.

What is Too Much Pressure?

Just what constitutes too much factory pressure probably never will be determined by formula. Any active, effective factory sales organization must of necessity urge dealers to sell cars to a maximum of their ability. The fact that a dealer finds it impossible to handle used cars properly and at the same time dispose of a given number of new vehicles does not always argue that the factory is wrong. If factories simply shipped to dealers "by request," the total volume of sales made by the industry, both of new and used cars, undoubtedly would be much smaller than it is today. There is an old saying that "Big fleas have little fleas upon their backs to bite 'em and little fleas have other fleas and so on ad infinitum." And it's well that this should be so. Everybody needs some prodding if he is to do his best.

So the ideal condition is reached when the factory pushes the dealer just hard enough—whatever that may be. The used car problem cannot be solved, of course, unless the factories hold down their production sufficiently to permit profitable handling of used cars by dealers. But dealers cannot properly attribute all their used car losses to factory overproduction.

A while back, we asked a lot of factories to tell us exactly what they were doing to help dealers handle their used car problems. Among others, one factory wrote as follows:

"Frankly, we have not entertained any deliberate program for helping our dealers in the solution of

their used car problem. We believe that the greatest help a manufacturer can give its dealers in the solution of their used car problem is to refrain from any action which necessarily complicates that problem. We refer particularly to the more or less prevailing practice of overproducing and the inevitable consequences of forcing more cars on dealers than their particular markets would digest legitimately."

When a dealer friend of ours happened to see that statement one day he remarked: "There's the whole story. That's the one way the factory can help the dealers most as regards used cars."

Must Draw Line Somewhere

And there is much of truth in that conclusion. But the question isn't quite so simple as that. Granted that the factory wishes to refrain from overloading dealers, it certainly wants to load them as heavily as possible. Where is the line in any given case? It varies, not only with the capacity of the territory to buy, but also with the capacity of the dealer to sell. And it is only fair to say that the policy above outlined carried out too far on the safe side of refraining from overloading is very likely to result not only in decreased sales for the manufacturer but also in decreased profits. Overloading, on the other hand, has produced similar unfavorable results for other factories.

Thus, the manufacturer is driven to the old search for Aristotle's golden mean. And study of marketing data, business trends and statistical information on economic tendencies is helping the factory executive today to find that desirable but elusive factor more frequently than ever before.

We are at present in the midst of a more competitive period than for many months past. The temptation to overload has become greater as sales have dropped off in the last weeks of the summer and the early ones of the fall. It is at this time that the factory executive may well halt any too furious merchandising activity designed to meet temporary conditions, at least long enough to be sure he hears the dull beat of the economic tom-tom as it continues to drone with infinite monotony . . . used cars, used cars, used cars, used cars. . . .

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800 hp. Fiat Engines Used in Italian Seaplanes

THE victory of the Italians in the Schneider Cup races for seaplanes at Hampton Roads, Va., Nov. 13, was so decisive as to leave no doubt that they had the better ships. In the preliminary tests they demonstrated their ability to get off the water quickly, showed excellent maneuverability and displayed a landing speed estimated at about 80 m.p.h. While details of design have not been released, the ships are reminiscent of one of last year's British entries, the Supermarine-Napier. The method of mounting and bracing the floats, however, differed considerably in that they were much more ruggedly mounted, with considerable cross-bracing. The Macchi Co. deserves a good deal of credit for having developed these planes in the short space of a year, it being remembered that previously this company had been confining its seaplanes to the flying boat type.

Four world's seaplane speed records were broken by Major De Bernardi of the Italian team, who won the race at an average speed for the 350 kms. of 246.496 m.p.h. Major De Bernardi and his team mates all used Macchi machines, which are twin seaplanes of the monoplane type, powered with the new Fiat aircraft engines. These engines developed about 800 hp. at 2700 r.p.m.

With the Curtiss R3C4 racer, powered with a Packard "1500" engine developing 686 hp. at 2700 r.p.m., out of the race due to a crack-up on landing in the preliminary tests, America's hopes for winning the race again this year, and thus obtaining permanent possession of the cup were pinned on last year's racer flown by Lieut. Cuddihy, which had been equipped this year with a "1550" Curtiss engine developing around 700 hp. Lieut. Cuddihy, however, was forced out of the race on his last lap.

Lieut. C. F. Shilt of the Marine Corps, who was the third U. S. entry in the race and who finished second with an average speed of 231.36 m.p.h., was flying the same plane with which Lieut. James Doolittle won last year's Schneider Cup race at an average speed of 232 m.p.h.

Capt. Arturo Ferrarin of the Italian team was forced out of the race with engine trouble on his third lap. Capt. Ferrarin's speed at that time had been considerably better than that of any of the American entries, he having covered the first 150 kms. at an average of over 238 m.p.h. Third Italian entry, flown by Lieut. Adriano Bacula, covered the entire course with a partially closed throttle, acting in the capacity of reserve ship in case his two team-mates should both be forced out of the race.

Comparing the Italian and American entries, the Italian ships were of brand new design as compared to the American ships, which were last year's racers. The Italian planes evidently had a much larger float capacity than the U. S. entries. The Italian planes were also higher powered than the American. The Fiat engines developed over 100 hp. more than the engines used by this country. It will be interesting to observe whether America's next entries in the Schneider Cup race are to be of the monoplane or biplane type. Up to now the biplane type has been favored in this country while monoplanes have scored the biggest successes abroad.

Following is a summary of this year's race:

Entrant	Plane	Engine	Finish	Average Speed
De Bernardi	Macchi	Fiat 800 hp.	1st	246.496 m.p.h.
Shilt	Curtiss	Curtiss V1400	2nd	231.36 m.p.h.
Bacula	Macchi	Fiat 800 hp.	3rd	218.01 m.p.h.
Tomlinson	Curtiss	Curtiss	4th	136.96 m.p.h.
Ferrarin	Macchi	Fiat 800 hp.	3 laps	238.36 m.p.h.
Cuddihy	Curtiss	Curtiss 1550	6 laps	239.19 m.p.h.

THE Italian Department of Finance is at present considering an increase in the duty on motorcycles, at the request of the native motorcycle industry. Up to the present the duty amounted to substantially 12 per cent ad valorem (the official rate being so much per hundredweight and not on an ad valorem basis). The proposal is to increase the rate to 350-400 gold lire per 220 lb., which, it is estimated, would be about 24 per cent ad valorem. Under the present regime in Italy the Minister of Finances is empowered to revise tariffs and issue embargoes by decree and the expectation is that the proposal will go through. It is said to be directed especially against England.

THE embargo on the importation of passenger cars into Greece, which had been in force for some time, was raised on Sept. 15.

New Automotive Parts, Accessories *and* Tools

Durator Piston

A NUMBER of features are incorporated in the Durator piston which has been introduced recently by the Duroseal Corp., Cleveland, Ohio. Pressure at the piston head is applied directly to the pin bosses through rib structures while these bosses are entirely separate from a new type of skeleton skirt. In the design of the skirt, ample bearing surface is obtained and distortion due to the load on the piston head is minimized.

Perhaps the outstanding feature of the piston is the ring design. Provisions are made for but two rings, the lower of which is the slotted scraper type set in a drilled groove. The upper ring assembly consists of three segmental units of low friction non-scoring alloy. Due to the segmental construction, this ring assembly exerts no pressure on the cylinder wall except during the compression and firing strokes and it is stated that the pressure when exerted is in approximate proportion to the pressure within the combustion chamber, which tends to expand the segmental assembly to produce the sealing action.

Fig. 1 illustrates the components of the piston and ring assembly. A flat head and short cylindrical section in which the rings are mounted are joined to a ring forming the bottom of the skirt by two relatively narrow straps. As the piston is assembled in the engine, these straps are on the lateral center line and their outer surfaces are relieved so that the piston bears on the cylinder wall at the full ring at the bottom and a similar area located just below the scraper ring. The piston pin bosses are located between these two rings and are connected with the head by two ribs at each side which extend upward inside of the top of the piston.

Another feature which contributes to mechanical strength and elimination of oiling troubles is the shelf-like rib which extends around the inside of the piston at a point just below the drain holes for the scraper ring. This rib serves as a deflector for oil thrown off at the crankshaft and causes eddies which tend to draw off excess oil from the drain hole outlets. The ring forming the lower end of the piston is thickened slightly at the extreme bottom for additional strength and to provide a pilot for machining. This unit is cast iron of high nickel content which produces a hard tough alloy. Due to the skeleton construction, the weight is considerably less than that of the conventional design.

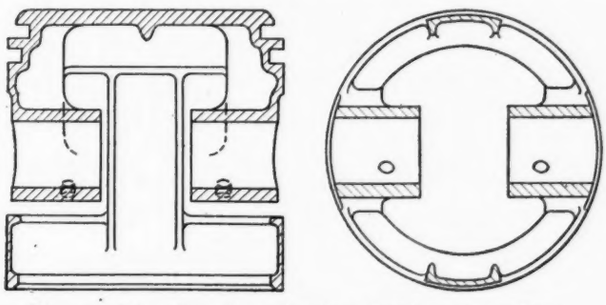


Fig. 2. Line drawing showing details of construction of Durator piston

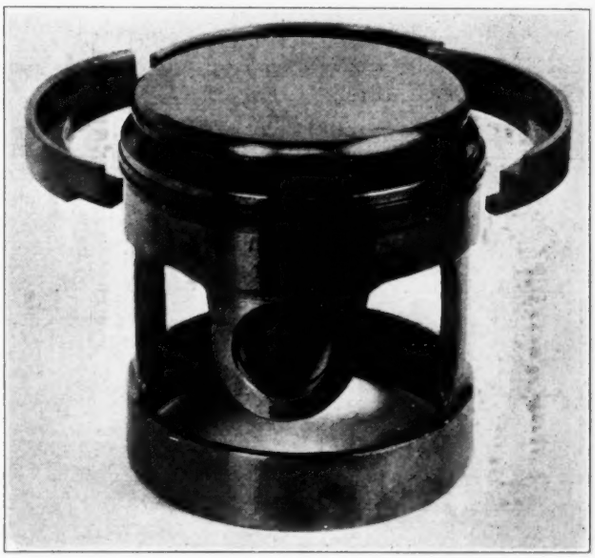


Fig. 1. Nickel iron skeleton structure carries one scraper ring and special three-piece alloy ring which is expanded by gas pressure. Piston bosses are joined to heads by two ribs each

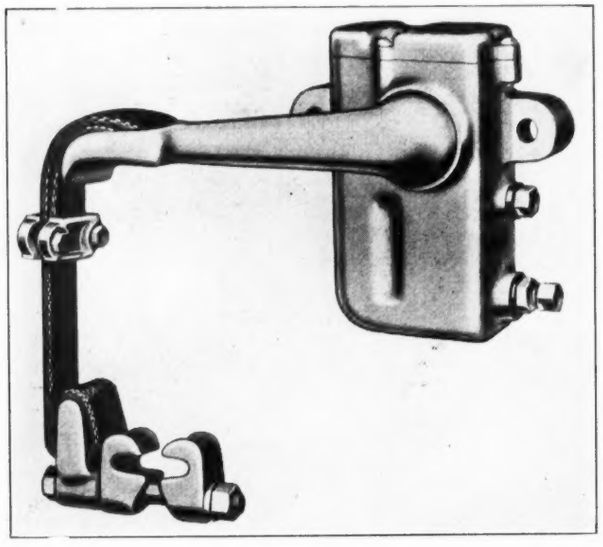
While the lower or scraper ring is set in a drilled groove of usual design, the upper ring assembly and its groove are unique. The groove is much deeper than ordinary and the top land of the piston is smaller in diameter and beveled off at the top. This arrangement provides room for the segmental ring assembly of L-shaped section. Obviously this assembly is inert and does not load the cylinder wall until pressure accumulating above the piston head tends to expand the segments. Sealing is assisted by the step joints in the segmental assembly. As operation is secured by gas pressure, no spring action is required and this assembly is made of non-ferrous, non-scoring alloys rather than the usual cast iron.

The new piston and ring assembly as installed in an engine tends to reduce friction and therefore increases the net output of the engine. As only one ring of the conventional type is carried by each piston, wall friction is at a minimum until pressure builds up over

the head. It is claimed that the relative absence of wall friction tends to reduce vibration. With the reduction of friction loss, fuel economy is improved while the sealing action of the special top ring reduces dilution. Tests have shown that the piston boss construction practically eliminates distortion of the skirt.

Monroe Shock Eliminator

A SHOCK absorber of the hydraulic type, known as the Monroe hydraulic shock eliminator, is made by the Monroe Auto Equipment Manufacturing Co., Monroe, Mich., in two sizes, one for heavy passenger cars and light trucks, the other for lighter passenger cars. This shock absorber acts on the same principle as other devices of the kind. On the rebound of the chassis spring, the actuating arm, connected to the



Monroe hydraulic shock eliminator

axle by a fabric woven strap, operates a cam which is formed integral with it and is located within the oil-tight case.

The cam in turn actuates a piston which forces oil from the barrel through a hole of adjustable size in its lower head, into the reserve oil reservoir. It is the resistance to the flow of the oil through the conical valve that checks the rebound of the spring.

Oil is returned to the piston valve through a simple ball check valve at the bottom of the barrel. The ball is held in place on its seat by a cage located within the piston spring at its lower end. The coil spring returns the piston to its normal position.

Adjustment of the shock absorber is made by turning the valve screw which opens and closes the orifice between barrel and oil chamber. Oil is supplied to the reservoir through a filling hole with screw cap located just above the adjustment screw, and this screw also indicates the proper level for the oil in the reservoir.

Powell Rubber Bushing

SILENCE and freedom from lubrication problems are distinctive of the expanded rubber bushing made by the Powell Rubber Bushing Co. of Utica, N. Y. In the construction of this bushing, a stud made of $\frac{5}{8}$ in. cold drawn hexagonal stock supplants the usual spring bolt. A live rubber core having a small central hole first is inserted into a steel outer shell of $1\frac{1}{2}$ in. diameter. Then a hexagonal center member which is rolled from seamless steel tubing is forced into the rubber core.

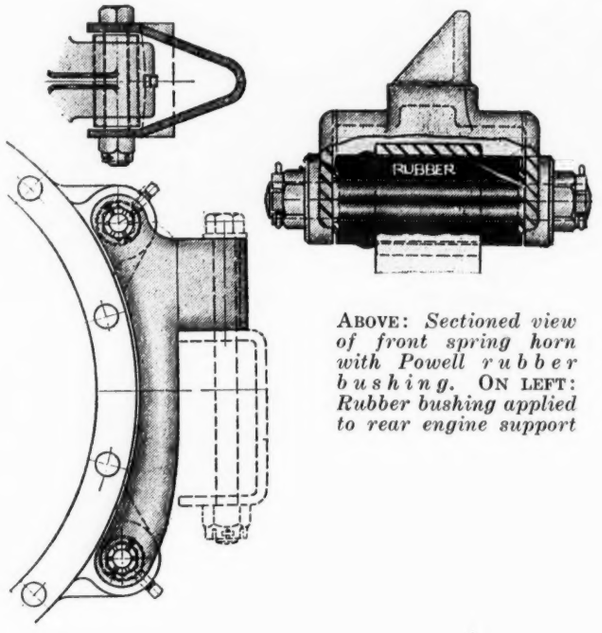
As this hexagonal member is much larger than the hole molded in the rubber core, the latter member is expanded into the outer steel shell, forming a unit which presents metallic surfaces to the mating members with a silent flexible core. Each end of the assembly is closed by steel washers which fit over extensions of the hexagonal inner member. It should be added that the spring bolt fits snugly into the hexagonal center member of the bushing.

In order to obtain a sufficient volume of rubber in the core it is necessary to make the width of the rubber bushing somewhat greater than that of the usual bronze bushing. For passenger car and similar service, the width between ends of the support brackets or shackles ranges from $3\frac{1}{4}$ in. to $3\frac{3}{4}$ in. Assembly of the bushing in springs is facilitated by a locating bead rolled in the outer steel shell.

A test for radial deflection which was made recently presents some interesting figures. In this case the bushing was $3\frac{3}{4}$ in. long. The deflections for various loads are tabulated as follows:

Load lb.	Deflection in.
1135	.025
2266	.051
3646	.077
3886	.089

When supported by the outer steel shell and loaded at one end of the inner member, the maximum permissable end thrust was 900 lb. Tests for torsional



ABOVE: *Sectioned view of front spring horn with Powell rubber bushing.* ON LEFT: *Rubber bushing applied to rear engine support*

flexibility of the rubber core show that angles much greater than those encountered in spring installations can be negotiated without damage.

A typical front spring installation is shown above. In case of spring breakage at the main leaf, the axle is not dropped but still is held by the longer of the broken sections. On the left is shown the application of

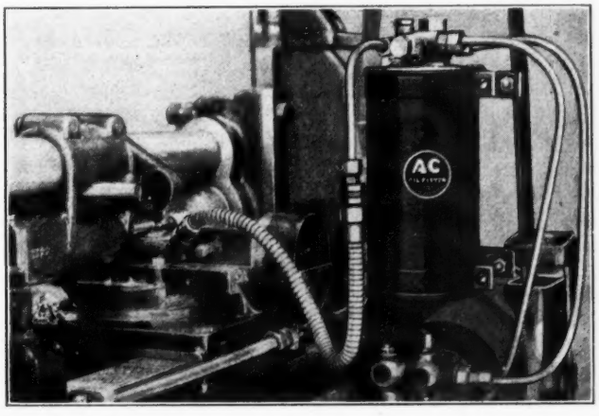
the rubber bushing to rear engine supports. Use of four bushings in conjunction with pressed steel brackets is recommended. When spring eyes are dimentional properly, no set screws or other holding devices are required, as the bushing merely is pressed into the spring eye.

In addition to the sizes intended for passenger car installations, the manufacturer is developing a larger type of this same basic design for bus and truck applications.

AC Industrial Oil Filter

THE AC oil filter, made by the AC Spark Plug Co. of Flint, Mich., has been turned to industrial uses in filtering cutting compounds of such machines as grinders, hobbing machines, thread cutting machines, etc. The increasing demand for fine finishes on machined parts has led to measures for eliminating all causes of poor finish and one of these is to remove grit, dirt and chips from the cutting compound.

The oil filters are so arranged that when they become filled with dirt removed from the compound a replacement cartridge can be installed quickly, with very little loss of machine time. Filtering capacity to suit the demands of particular machines is provided by connecting several filters in multiple. These filters are not intended to take the place of the usual sediment tanks and strainers, but to supplement them.

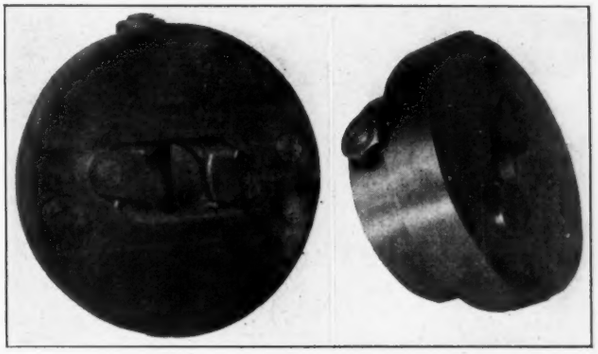


Installation of AC oil filter on machine tool

Automatic Driver

ONE of the recent developments in the machine tool field is an automatic driver for turning operations. Designed for use on either bar stock or forgings by the Seneca Falls Machine Co. makers of Lo-Swing lathes, this driver is available for other types of turning equipment and its outstanding feature is the ability to grip the part firmly without damage regardless of the concentricity of the drilled centers. Application to the spindle nose can be made in accordance with the design of the machine to which the driver is to be applied.

As shown in the illustration, a flanged steel member fits on the spindle nose. A slot is cut in the face of this member and in this slot is fitted a sliding member of hardened steel. Two flat headed screws in small slots limit the travel of the hardened steel member to about 3/16 in. In turn the hardened steel sliding member carries two hardened steel spring-actuated pawls or dogs which have spiral serrated surfaces at their inner ends. Travel of these pawls is limited by stop pins and the spirals are arranged so that rotation of the



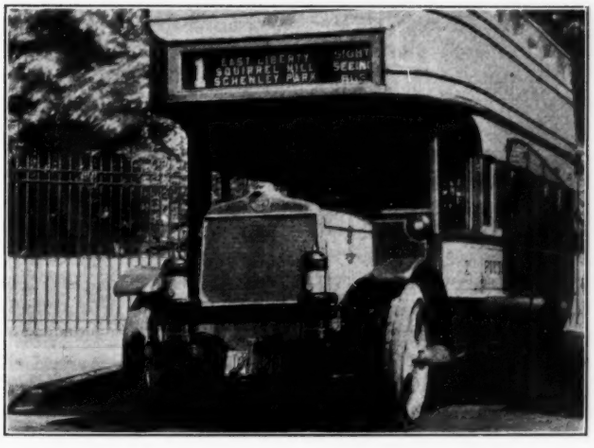
Two views of automatic driver which grips and drives bar stock and forgings positively in turning operations regardless of concentricity of drilled centers

head stock tightens the grip of the pawls on the stock.

Size of the serrations is modified for hard and soft stock so that the part is not scored below the usual grinding allowance, which is about .007 in. on a side. When the turning operation is complete, the spindle is stopped, the tail stock is backed off and the piece is reversed slightly by hand and then lifted out. In the present model, the diameter of the driver is about 9 in., although different sizes of stock can be accommodated by changing the pawls. No unusual attention need be paid to drilling turning centers concentric with the circumference of the stock as the sliding action of the pawl carrier allows the driving pawl to center automatically and drive positively without slack.

Heavy-Duty Air Spring

THE Mogul is the name given to the newest member of the line of Gruss air springs made by The Cleveland Pneumatic Tool Co. The new spring is a larger model than has been made heretofore and is intended



New Mogul air spring mounted on double deck bus

for use on double-deck buses and on trucks of from 5 to 7 tons capacity. Its bore is 4 9/16 in., stroke 6 in., piston area 16.349 sq. in., and bearing area 164.4 sq. in.

What We May Expect From

Store-Door Freight Delivery

Coordination of railroad and motor trucking services will give shippers faster and cheaper delivery. Idea not new. First trial made in 1867.

By G. Lloyd Wilson

Assistant Professor of Commerce and Transportation
University of Pennsylvania

DOOR-TO-DOOR freight service as an extension of our present American system of station-to-station railroad freight service is receiving more serious consideration by the railroads, the shipping public and the automotive industry at this time than perhaps any other single transportation problem before the American public.

Door-to-door freight service, as is generally recognized, contemplates the coordination of railroad and motor trucking services so that goods may be moved in one connected series of transportation services by motor, rail and motor from the shipping platform of the shipper in one terminal to the receiving room of the consignee in another city without delays or breaks in the continuity of the movements at the originating and delivering carriers' freight stations.

The plan of store-door delivery most frequently advocated proposes to deliver package freight directly from the car or station at destination without waiting for the arrival notice to be sent the consignee and without the consignee having to send his own truck for the goods. The same vehicles used to make deliveries to industries would be used to pick-up outbound shipments from these places for movement to the freight stations and then by railroad to their final destinations in other cities. Goods would be handled directly from railroad cars to trucks and likewise from trucks to cars.

Store-door service seeks, of course, three major objectives: First, faster and more economical freight service for shippers; second, greater economy in the use of railroad and motor facilities; and finally, a quicker and less expensive system of handling freight in the terminal areas.

The plans of store-door service as they are being discussed and experimented with at the present time appear capable of affording some measure of relief from

the present terminal conditions, which are rapidly becoming intolerable. The line haul service of American railroads in carrying large units of freight traffic long distances at very low rates per ton mile is one of the greatest American industrial achievements. Even low grade commodities, which in Europe move by canal, river or coastwise water routes, because of the great differences between rail and water rates, are frequently moved, in this country, by railroad. The efficiency of American railroads in line haul terminal-to-terminal service is discounted, however, by comparative inefficiency in the terminals. The most adequate and authoritative study yet made of line haul and terminal movements of railroad traffic shows that the average shipment of freight spends only about 10 per cent of the elapsed time in movement between terminals, and nearly 90 per cent of the time in yards and at the terminals.

It would seem that any system of freight handling that has been found effective in speeding up the movement of freight in the terminal districts would be seized upon as a possible remedy. However, established business practices are slow in changing. Such is the force of inertia.

There are several definite factors to be reckoned with before door-to-door freight service becomes an established fact.

Idea Must be Sold

In the first place the essential elements of the plan must be worked out and the idea "sold" to the general shipping public. The public must be made to understand that the store-door delivery plan is not the harebrained scheme of some impractical idealist but that the operation has been performed on a small scale before in the United States, in the days of the horse-drawn vehicle, and that the service was discontinued, not because it broke down, but because it resulted in unfair discrimination which the carriers were unable in that day to eliminate without extending the service beyond the limits to which they were prepared to go. The success of the plan in Canada and in England must be brought to the attention of laymen in transportation.

A second obstacle in the way of store-door delivery today is the inertia of the railroads. Many progressive railroad officers already have expressed their conviction that a system of organized cartage service or store-door delivery is necessary with the rapid growth of railroad freight traffic, the increase in size of the important cities and the resulting congestion of railroad terminal yards and city streets. But American railroad managements are as a rule conservative and the policy of many roads is that of watchful waiting until a properly prepared plan of store-door delivery is urged by shippers and consignees and until terminal congestion becomes even more intolerable.

A number of roads have already started experimentation with terminal freight handling plans, many of which have store-door delivery as an ultimate goal. The rail carriers for the most part have preferred to have outside concerns perform the local cartage service in the terminals under contract with the railroads, rather than own and operate their own motor vehicles, in order to avoid the investment in motor equipment and undertake the management of the service themselves. The three foremost installations of motor terminal service, as the automotive industry knows, so far have been established by independent motor haulage companies: The Columbia Terminals Co. in St. Louis, The Cincinnati Motor Terminals Co. at Cincinnati, and The United States Trucking Corp., in New York City.

It is not a matter of moment, as far as the interests of the shipping public are concerned, whether the store-door service be performed by the railroads themselves, by subsidiary corporations of the railroads or by independent motor haulage companies. The important thing is that a coordinated service assuring rapid terminal handling at low rates and with definite responsibility for the safety of the goods from the store door of the shipper to the store door of the consignee be offered shippers and consignees.

A third obstacle in the path of store-door freight service is the apathy and antagonism among certain groups of shippers and consignees, many of whom do not fully appreciate the significance of the plan. Shippers and consignees have become accustomed to using their own trucks or hiring independent truckers to haul their goods between their warehouses and the freight stations. They are in the habit of sending freight to and collecting it from the freight depots when and as they please, and, although they are frequently heard to complain of poor service and slow deliveries, they are not eager to revolutionize railroad freight transportation practices which have become a fixed part of business routine.

Convincing the Business Man

If business men become convinced of the inefficiency of using motor trucks to a fraction of their capacities to haul goods to and from freight stations when the same amount of freight could be hauled in far fewer trucks loaded more nearly to their capacities through a coordinated railroad-motor truck cartage service, and that freight depots should be used as receiving and delivering facilities and not as warehouses, then the store-door delivery plan can be expected to make headway.

Store-door delivery service is not absolutely new in this country. A plan of service of this character was inaugurated by the Philadelphia, Baltimore and Washington Railroad in Baltimore in 1867 and continued by

A BRIEF, interesting summary of the present status and future prospects of store-door delivery in the United States is given by Mr. Wilson in this article.

After pointing out three of the main obstacles in the way of rapid, immediate development of the door-to-door delivery idea, he pictures briefly the experiences of the past, which are partly responsible for the cautious attitude toward this development assumed by certain railroad groups today.

Mr. Wilson is well qualified to discuss transportation problems. He has had extensive experience in traffic management and has many works to his credit on the problems of motor transport, traffic development, rates and fares, tariff, shipping documents, public regulations, etc. In addition to being assistant professor of commerce and transportation at the University of Pennsylvania, he also lectures on interstate commerce at Temple University and heads the course in motor transportation at the Wharton School, University of Pennsylvania.

the Pennsylvania Railroad when it took over the P. B. & W. R. R. in 1881. In 1883 the Pennsylvania Railroad introduced the service to Washington and in 1896, when its Philadelphia and New York connections were completed, the Baltimore and Ohio Railroad established the service in Baltimore and in Washington simultaneously to compete with the service offered by the Pennsylvania. Both roads provided free delivery of less than carload freight, from New England points, New York City and Philadelphia to the store doors in Baltimore and substantially all of the city of Washington, and for the pick-up of goods at the store doors in Baltimore and Washington when destined to points in New England, New York and Philadelphia.

There were many exceptions where the service was not granted, and in general no service was given in connection with traffic to or from the South or West.

This form of store-door delivery was in operation for 44 years without interruption, but on Sept. 19, 1911, a fruit and confectionery merchant in Washington complained to the Interstate Commerce Commission that the failure of the carriers to deliver shipments to him while making delivery to a nearby competitor constituted unjust discrimination.

Service Finally Withdrawn

This was the beginning of a long period of litigation which finally resulted in both railroads abandoning the service. They realized that it was necessary either to keep on expanding the service indefinitely or withdraw it entirely, and as they were not prepared to do the former they decided on the latter.

Since that time several successful experiments with store-door delivery have been made along slightly different lines. The main features of the more recent installations are more or less familiar to most automotive men.

The terminal motor service at St. Louis, performed by the Columbia Terminals Co., a local independent cartage company under contract with 23 railroads, is primarily a station-to-station terminal motor service rather than a plan of store-door delivery. The railroads bear the expense of the transfer of the goods between the railroad and motor haulage company stations and assume responsibility for the safety of the goods between these points. Store-door pick-up and delivery of goods may be arranged for by an agreement between shippers or consignees and the Columbia Terminals Co. for an extra charge paid by the shippers or consignees.

The motor freight service of the Cincinnati Motor Terminals Co. is confined at the present time to the movement of less-than-carload freight between the 27 major and minor freight stations of the seven railroads serving Cincinnati and with the interchange of less-than-carload freight between the rail carriers in the district. The plan has been successful in economizing in railroad freight station warehouse and platform space, in avoiding additional track and terminal construction, in releasing cars formerly used in station-to-station switching, trap or ferry car services to more productive uses, and in speeding up the movement of less-than-carload freight in the terminal.

The United States Trucking Corp. acts as the agent of several railroad lines in New York City in performing local cartage service between the Jersey terminals of the railroads and the off-track stations of the trucking company in New York City. The New York Central alone has access to Manhattan Island over its own line of railroad tracks. All other railroads have been compelled to establish terminals on the Jersey side of New York Harbor and to make the deliveries of freight by lighter and carfloat to their pier stations in Manhattan.

The service developed by the United States Trucking Corp. includes the use of three principal warehouse stations for receiving and delivering goods in the business districts of the city, trucking service between these stations and the Jersey terminals of the rail carriers, and in some cases direct door-to-rail terminal and rail terminal-to-door service for the carriers and shippers and consignees. The carriers compensate the trucking company for the movement of goods between the railroad terminals and the off-track warehouse stations and assume full common carrier liability for the goods.

Consignees and shippers may arrange for the direct cartage of their goods from and to the Jersey terminals of the railroads. In such cases the freight is moved between the railroad terminals and distributing stations at the ferry slips at the expense and under the liability of the railroad carriers.

The trucking service of the Boston and Maine Transportation Co., a subsidiary of the Boston and Maine Railroad, includes station-to-station service by motor truck to replace way freight service, and store-door delivery and pick-up services in Boston, Lowell and Lawrence, Mass., in connection with the movement of less-than-carload freight movements via the Boston and Maine from and to all points reached by the rail line or its connections.

In England, the railway companies perform store-door collection and delivery service with their own motor lorries and horse-drawn vehicles. The service was first offered more than 50 years ago by independent cartage companies which have since been acquired and are now controlled by the railway companies.

Store-door service is almost as old as the railways in Canada and is extended to merchandise and package freight in all of the important cities of eastern Canada. The service is automatically performed in connection with all merchandise or package freight excepting a limited group of commodities which are not handled by cartage vehicles. The vehicles are owned and operated by independent cartage concerns but the service and charges are governed by the tariffs of the rail carriers as a part of merchandise or package freight service. All goods of these classes for all consignees, excepting the consignees who have notified the agents of the rail carrier of their intention to do their own carting, are delivered direct from railroad freight cars to the cartage vehicles. Outbound shipments are collected by the vehicles of the cartage companies upon requests of shippers.

The steadily increasing volume of freight traffic, the growth in size of the larger American terminal cities, the rapid increase in the number of motor vehicles in passenger and freight service in the cities, the development of new commercial and industrial districts and the increasing congestion of cities—all these factors are impelling shippers and carriers toward the coordination of rail and motor freight service in a plan of store-door delivery in order to maintain and improve the efficiency of the American transportation system. It seems to offer the most feasible plan for the efficient use of railroad freight stations, freight cars and motor vehicles to the ultimate benefit of the carriers, the manufacturers and distributors of automotive vehicles and to the shipping public. The interests of all three groups are identical, namely, improved transportation service at a lower cost per unit of freight, and the enlightened self-interest of each group seeking to solve its own problems in this connection will ultimately bring about store-door freight service in the United States as it has in England and Canada.

EDITORIAL

The Foreign Trade Deficit

CONSIDERABLE optimism for the future of our foreign trade seems warranted by a recent report of the National Foreign Trade Council to the effect that the United States is still at least 10 years short of catching up with the normal trade total which might have been expected but for the intervention of the war.

Total foreign trade of the world has fallen short by more than $210,000,000,000 of the merchandise exports which would have been made under ordinary conditions. From 1909 to 1913 world trade advanced at the rate of 6.5 per cent per year. Had this rate of growth been continued since 1913, world trade figures would have been $41,500,000,000 in 1925 instead of the actual figure of $19,950,000,000.

According to the Council report, the United States has gained almost 32 per cent in real exports since 1913 and has made greater progress than any other nation, but our export trade still is over $2,000,000,000 behind what it would have been if the pre-war growth had been uninterrupted.

These figures point to the fact that there still is a vast shortage of goods in the world. As the various nations return to normal conditions there will be and already have been strong efforts made to regain the ground lost and, in supplying the demand thus created, foreign trade of this country should continue to expand, possibly more rapidly than it has during the past few years.

A Lower Steel Standard

IT has long been known that the most injurious impurities in steel are sulphur and phosporous. When the S. A. E. specifications for automobile steels were first drawn up, the committee in charge of the work, realizing the need for materials of the highest quality, purposely set the limits on these impurities very low.

Holding to these low limits on impurities has cost the automobile industry a great deal of money. The S. A. E. specifications are very handy and would have been used more by other industries had it not been for the fact that it was possible to buy otherwise equivalent steel that was good enough for agricultural implements and similar work, at a considerable saving.

It is now proposed to raise the sulphur and phosphorous limits by 0.0005 per cent, on the recommendation of a metallurgical committee of the General Motors Corp. The constant increase in the quantities of steel required for automotive production and bought to S. A. E. specifications, together with the fact that there is a tendency for both ores and fuels to deteriorate with the passing of time, because the purer deposits are worked first, would seem to warrant this step. While it must be admitted that steel produced under specifications allowing greater percentages of these impurities will, on the average, be slightly inferior, the rapid progress in design in recent years easily offsets this. In other words, with steels made under the proposed specifications it will be possible to build cars that are both lighter and safer than could be built with steel made under the original specifications, say, a decade ago.

Motive Power on the Farm

THE farmer is dissatisfied! To some observers this appears as a chronic complaint for which there is no remedy; to others, who, we may hope, see more clearly, the complaint is curable and to a part of it the automotive industry has the cure. The farmer, say these optimistic observers, suffers from various ailments among which is a lack of development in mechanical processes of production; he still is doing by hand and animal power those tasks for which industry has long since utilized machinery; he needs to use more tractors in carrying on his farm work, more trucks in connecting his farm with the market, and more passenger cars to bring pleasure and enjoyment into the lives of himself and his family.

There are nearly 700,000 farm-owned tractors now; well over 500,000 farm-owned trucks and something better than 4,000,000 passenger cars. These are formidable figures but still there is only about one tractor for every 13 farms and one truck for every 17 farms. About 60 per cent of the total horsepower hours used on farms is still contributed by horses and mules.

The tractor operates at less cost and with much less time than horses or mules, permitting more extensive cultivation, profitable use of marginal lands with low yields and many other advantages. The use of trucks permits the farmer to seek better markets, to lose less time on the journey and to make his work more interesting and profitable. Although these things may be known it takes time for the farmer to adapt himself to new conditions no matter how advantageous.

Development of the tractor and the truck may be expected to go through a probationary period, as have other farm machines, but at its end their general adoption may prove beneficial in relieving the farmer of his present dissatisfaction.

AUTOMOTIVE NEWS SECTION INDUSTRIES

Philadelphia, Pennsylvania

Thursday, November 18, 1926

Retail Sales Improvement Checks Production Decline

PHILADELPHIA, Nov. 18—Moderate sales gains in the motor car market have been made in the last week or two partly as a result of fine weather conditions in most sections of the country. The decline in manufacturing has been checked and in a few instances production rates have been stepped up at the manufacturing centers.

As a whole, the industry continues well below capacity. Current output rates are considered satisfactory, however, for the season and no complaint will be heard if approximately the same level is maintained for the remainder of the year. Then a gradual upturn will be looked for, stimulated by the opening of the automobile show season.

Competition is tightening in some of the price classes, and with additions to lines and models soon to be made the struggle for business next year will be keener than ever. An increase in the lines of middle and low priced eights is likely to be one of the outstanding developments of the new season, as several makers are convinced that the market for this type of car is destined for broad expansion. But new sixes are also to be introduced.

Although three or four companies were eliminated this year, the number of different cars to be displayed at the national shows is likely to be equal to, if not larger than at the last shows, as several of the big producers have added completely new cars. The tendency for manufacturers to offer lines in two or more price classes to their dealers is on the increase.

Forecasts for 1927 generally agree that it will be more of a color year in automobiles even than 1926. Nothing radically new in body lines or chassis design is looked for, but some of the engineers may be preparing surprises.

Sir William Letts Here

NEW YORK, Nov. 17—That a closer union of manufacturing ideas between European and American manufacturers is coming, is the opinion expressed by Sir William Letts, president of the Society of Motor Traders and Manufacturers of Great Britain, who arrived on the Majestic this morning.

AC Offers New Plug

FLINT, Nov. 16—A new spark plug developed especially for bus, truck, marine and other heavy duty equipment, is announced by the AC Spark Plug Co. The new plugs will retail at 90 cents and will be provided in three sizes: ⅞ in. long thread Type D; metric Type G and ⅞ in. long body Type I.

Finance Association Wants Dealers Free

CHICAGO, Nov. 17—The fight between independent finance companies and those having direct relations with automobile factories was intensified here yesterday by the action of the National Association of Finance Companies in passing a resolution favoring freedom for dealers in the choice of financing methods and companies. The resolution marked the climax of the third annual convention of the association, which drew about 450 members and guests, or double the number a year ago.

Emlen S. Hare, vice-president, Hare & Chase, Inc., and chairman of the factory relations committee organized last year by the association, said the committee stood for financing rates high enough to cover the entire cost of financing including a fair profit; for allowing free choice to dealers, and for elimination of advertising of rates and terms. He then offered the resolution on dealers, which was passed. It follows:

"Resolved, that the dealer be permitted freedom of choice to select the method of financing and that finance company which will best serve him in his locality."

Repossessions Gain 18 Per Cent

A survey made by C. C. Hanch, general manager of the association, showed a gain of 18 per cent in repossessions on new cars financed on standard terms this year as against 1925, and a gain of 41 per cent in used cars financed on standard terms. There were also increases in repossessions where non-standard terms were followed. It was also shown, however, that the percentage of special paper declined considerably during the year.

Alfred Reeves, general manager of the National Automobile Chamber of Commerce, told the members that reports of the slackening in motor car business had been exaggerated, as usual.

STUDEBAKER TO BUY BALE PER CAR SOLD

SOUTH BEND, Nov. 18—The Studebaker Corp. of America will buy a bale of cotton for every Studebaker car sold in the South during November and December. The cotton will be purchased at market price, stored and kept off the market for at least six months, according to announcement by A. R. Erskine, president.

The company expects to sell between 3000 and 5000 cars in the South during this period and on this basis its investment in cotton will be between $150,000 and $250,000.

Twyman Heads New U.S. Weymann Body

INDIANAPOLIS, Nov. 18—The Weymann American Body Co. has been formed here with B. W. Twyman, president; H. Steinbrugge, vice-president, and W. H. Colvin, Jr., treasurer. The company will locate a plant in the former National Motor Car Co. buildings here to make Weymann closed bodies on special order. It will also license the manufacture of this patented body type by other body and car makers.

Though the American company is to be independent of the European companies, three of the directors of the new company are officials of the European company. These are C. G. Weymann, president, Maurice Dolphus and Mr. Steinbrugge. A corps of workmen have been brought over from the Paris plant to do the initial work and instruct local workmen in the manufacturing processes.

The company will proceed at once with the manufacture of sample bodies for show exhibits and also on special orders already received. Later other licensed establishments in different parts of the country will be set up for body making, following the merchandising practice of the European company.

T. J. Litle, Jr., Appointed Marmon Chief Engineer

INDIANAPOLIS, Nov. 17—T. J. Litle, Jr., has been appointed chief engineer of Marmon Motor Car Co. Mr. Litle until recently was chief engineer of the Lincoln Motor Co. division of Ford Motor Co. Since leaving Lincoln he has been serving as engineer for Copeland Products, Inc., Detroit. Mr. Litle is also president of the Society of Automotive Engineers.

Willys Backs New Wayne Company

John A. Nichols, Jr., Heads Organization to Make $1000 Knight Engine Car

DETROIT, Nov. 16—Development of a large group of companies to manufacture Knight engined cars in the United States is seen in the announcement of the Wayne Motor Car Co., financed in part by John N. Willys, president of Willys-Overland Co. and leader in introduction of the Knight engine in America.

The activity of Mr. Willys recently in acquiring the F. B. Stearns Co., in arranging for the sale of the Knight engined Daimler in the United States, and now in the formation of the Wayne company is pointed to in this respect.

John A. Nichols, Jr., who resigned this year as vice-president in charge of sales of Dodge Brothers, Inc., will be president of the new company. Associated with him are R. N. Harger, formerly advertising manager and more recently representative in Great Britain of Dodge Brothers, and R. H. Allen, formerly director of purchases, for the same company. D. R. Wilson, vice-president and general manager of the Wilson Foundry & Machine Co., and Frank Tillotson, Detroit banker, will be directors.

It is planned to locate the plant in the Detroit district, the name of the new company being taken from Wayne County in which Detroit is located. General offices for the present are in the Majestic Building, Detroit. There are a number of plants available.

Details as to the construction of the car are being reserved though it is stated to have passed beyond the experimental stage and to be fully complete in design. General specifications declare it to be a medium sized Knight six selling in the $1000 price class.

The car will not be ready for presentation at the national shows but will be exhibited at many of the large city shows in the spring. The company in the meanwhile will proceed with its plans for manufacturing and will develop a sales organization gradually.

Plan 300 Daily Output on New Erskine Models

SOUTH BEND, Nov. 17—The Erskine Six will be placed on the market in this country at the National Automobile Show in New York, it has been stated definitely by A. R. Erskine, president of the Studebaker Corp. of America. The car was introduced in Europe at the Paris Salon in October, and has since been exhibited at the Olympia Show, London, and at Edinburgh and Berlin. The Erskine is an addition to the Studebaker line and will be sold exclusively through Studebaker dealers. The new car will get into production in January at the Detroit plants of the corporation. Four models will be built, five-passenger four-door sedan, five-passenger touring with folding top, four-passenger coupe with an auxiliary seat in the rear deck, and a two-passenger business coupe. Production schedules call for 300 cars a day by spring.

S.A.E. Meeting Joins Rail and Truck Men

BOSTON, Nov. 18—Making his first address to a business organization since election, David I. Walsh, senator from Massachusetts, pledged his support to Federal aid for highways, automotive tax reduction and fair motor vehicle regulation, in an address at the Transportation Banquet here of the Society of Automotive Engineers. The banquet came at the close of the second day of the Transportation Meeting.

The meeting is being attended by more than 400 engineers, truck and bus operators and steam and electric railway representatives. While the necessity and possibility of coordination of motor and rail facilities have been emphasized throughout the meeting, a sharp exchange took place in the first session when W. P. Kellett said that the railroads in the future would have to get into the transportation business; that they never had been in the transportation business, thus far.

C. E. Lake of the Chesapeake & Ohio Railroad, and other railroad men, strongly objected to this statement and were supported in their objection by most of the automotive men present. "It cannot fairly be said," Mr. Lake contended, "that the railroads have opposed any form of transportation."

H. C. Horner, General Motors Corp., agreed with Mr. Lake's views in general but pointed out that the railroads without actually opposing motor transportation, might by a policy of watchful waiting materially hinder its progress. There is less tendency for railroads to adopt such a policy today, said Mr. Horner.

Bassett Estate $1,750,000

FLINT, Nov. 16—The estate of H. H. Bassett, late president of Buick Motor Co., approximated $1,750,000 according to his will filed for probate this week. One half of the entire estate is bequeathed to the widow, the remainder being divided between two children. The will was dated Aug. 5, 1926.

Apco Buys Anti-Shimmie

PROVIDENCE, Nov. 15—Apco Mfg. Co. has taken over the business of the Anti-Shimmie Mfg. Co., Kansas City, and has also acquired the exclusive right to manufacture and sell anti-shimmies under the Campbell patents No. 1,577,821 and 1,577,822, and the Dyer patent No. 1,317,912.

Business in Brief

Written exclusively for* AUTOMOTIVE INDUSTRIES *by the Guaranty Trust Co., second largest bank in America.

NEW YORK, Nov. 18—Despite some irregularities, trade in general continued last week in approximately the same large volume as during the several weeks preceding. Comparisons with last year's records, however, are no longer so strikingly or so uniformly favorable as a month or two months ago. Commodity prices in general receded slightly last week, while stock prices tended toward higher levels, regaining a large part of the preceding week's decline.

FOREIGN TRADE

The preliminary foreign trade report for October shows exports of $457,000,000 and imports of $383,000,000, as against exports of $449,000,000 and imports of $343,000,000 in September and exports of $491,000,000 and imports of $374,000,000 in October last year. The export balance for the year to date is only $161,000,000, as compared with $540,000,000 a year ago.

CAR LOADINGS

Car loadings reached a new high record during the week ended Oct. 30, numbering 1,216,432, as against 1,209,043 in the preceding week and 1,091,154 in the similar period last year.

BANK DEBITS

Bank debits to individual accounts reported to the Federal Reserve Board for the week ended Nov. 10 were 5.1 per cent above the total for the preceding week but 3.6 per cent below that of a year ago.

FISHER'S INDEX

Fisher's index of wholesale commodity prices stood at 152.9 last week, as compared with 153.5 a week earlier and 148.1 four weeks earlier.

FEDERAL RESERVE STATEMENT

Bills and securities held by the Federal Reserve banks declined $88,700,000 during the week ended Nov. 10, with decreases of $94,500,000 in discounts and $2,000,000 in holdings of government securities partially offset by a gain of $7,800,000 in open market purchases. Note circulation declined $4,600,000 and deposits $11,600,000, while reserves increased $35,200,000. The reserve ratio rose from 72.8 to 74.0 per cent.

During the same period, loans of reporting member banks declined $58,000,000, with declines of $65,000,000 in loans secured by stocks and bonds and $11,000,000 in loans secured by government obligations and a gain of $18,000,000 in "all other" loans. Investments decreased $44,000,000, borrowings from the Federal Reserve banks $103,000,000 and net demand deposits $85,000,000.

Money rates were generally easier last week, call loans ranging from 4¼ to 4½ per cent.

140 Gallons a Ton Oil Yield From Coal

Bergius Method Described to Bituminous Coal Conference as Fuel Guarantee

PITTSBURGH, Nov. 16—A description of his method of transforming coal into oil was given by Dr. Friedrich C. R. Bergius, of Heidelberg, Germany, at the opening session of the International Conference on Bituminous Coal at the Carnegie Institute of Technology here. A. C. Fieldner, chief chemist of the Federal Bureau of Mines, presented a program for fundamental research on coal and urged the raising of a $4,000,000 endowment fund.

Under his method Dr. Bergius said one ton of bituminous coal will yield an average of 140 gal. of oil. Deducting the coal consumed in the process the net yield is 104 gal. of oil per ton of coal. Of this 45 gal. represent gasoline, the remainder being gas oil, lubricating oil and fuel oil. Every grade of lignite and coal, with the exception of anthracite, may be liquefied, Dr. Bergius said.

Coal is built up into gasoline by this method, said Dr. Bergius. The coal is not broken down to extract oil but hydrogen is united with it under great pressure and high temperature. Between 40 and 70 per cent of the coal is converted into liquid fuel by this process, he declared.

Discussion following the afternoon session showed that scientists believed that if the oil supply of the United States should appreciably diminish, coal would be used as the source of oil, conversion being made at or near the mine mouth. The coal supply of the United States at the present rate of consumption was shown to be sufficient for upwards of 5000 years.

Professor Baker of Carnegie Institute said in less than a generation the present method of shipping coal to be burned in its raw state under boilers hundreds of miles from the mines will appear to have been primitive and crudely unscientific.

Kettering Says Shale Fuel Matter of Producing Cost

DETROIT, Nov. 13—Possibilities of procuring synthetic automotive fuel from coal or shale rock by means of the recently discovered cathode ray, were discussed by C. F. Kettering, president of General Motors Research Corp., in a talk before the Detroit Section of the Society of Automotive Engineers. "We will not have to worry about the quantity of synthetic fuel available by this method when our present sources of supply have been exhausted," he said, "the problem will be one of reducing manufacturing costs."

Over 325 members and guests, the largest number ever attending a regular Detroit Section meeting, heard Mr. Kettering.

SELF-CLEANING PLUG INVENTED IN SWEDEN

WASHINGTON, Nov. 17—A Swedish mechanic has invented and has sold the manufacturing rights to a new type of spark plug that keeps clean automatically, says a cable to the Automotive Division, Department of Commerce, from Stockholm. The rights sold to a Swedish firm cover Sweden, Norway, Denmark and Finland, the cable states. Rights are to be sold later to Germany, France, England and the United States, the inventor announces.

While the plug sells for slightly higher than the ordinary type, Swedish authorities expect that it will shortly be an important article of export.

Tire Stocks Show Drop in September

NEW YORK, Nov. 16—General reductions in inventories of casings and tubes are shown in the September report of the Rubber Association of America, Inc. These were accomplished despite the fact that shipments in September were lower than in August by a lessened production rate in all classes of tubes and casings except high pressure tubes and fabric casings.

The September inventory total of balloon casings is shown as 2,949,531 against 3,116,440 in August. Production in this month declined from 2,020,347 to 1,968,229 and shipments declined from 2,167,943 to 2,090,799.

Inventory of high pressure cord casings declined from 3,459,221 to 3,419,030; production declined from 2,246,111 to 2,143,498, and shipments fell from 2,581,574 to 2,182,732.

Inventory of fabric casings declined from 723,704 to 619,916; production rose from 137,828 to 167,868, and shipments declined from 308,329 to 256,655.

High pressure tube inventory increased from 7,143,811 to 7,165,399; production rose from 3,543,903 to 3,736,578, and shipments fell from 4,862,692. Balloon tube inventory declined from 4,552,647 to 4,318,512; production fell from 2,024,197 to 1,956,234, and shipments fell from 2,321,747 to 2,128,619.

Solid and cushion tire inventory showed a decrease from 178,060 to 165,082; production dropped from 43,579 to 42,572, and shipments declined 1494.

Rubber Imports Lower

NEW YORK, Nov. 15—Crude rubber importations for the ten months ended Oct. 31 this year totaled 337,952 tons as compared with 309,268 in the same period last year according to figures compiled by the Rubber Association of America, Inc., Imports for the month of October, 1926, were 28,114 tons as compared with 34,908 in October, 1925.

G.M.A.C. Bad Debts $358,395 in 5 Years

Raskob Says Ratio of Losses in Past Two Years Thirtieth of 1 Per Cent

NEW YORK, Nov. 18—Sale of automobiles on the instalment plan is responsible not only for development of the automobile industry to its present foremost position but in serving this end it has become one of the chief factors in the prosperity of many allied industries and, therefore, in the general prosperity of the country, John J. Raskob, chairman of the finance committee of General Motors Corp., said tonight in a paper read to the annual meeting of the Academy of Political Science.

The seven years' experience of General Motors Acceptance Corp., Mr. Raskob said, "clearly indicates that credit merchandising is constructive if properly used, and that consumers' credit so extended is wholesome and in every way desirable from an economic standpoint." Character rather than financial stability must be the basis of instalment selling of automobiles just as it is the basis of all other credit, said Mr. Raskob.

"How little the opponents of consumer credit appreciate the fact that the inherent honesty and character of our wage earners constitute the whole foundation upon which consumers' credit rest," declared Mr. Raskob.

In reviewing the experience of the acceptance corporation, Mr. Raskob said that in 1922, 1923 and 1924 it purchased consumers' obligations aggregating $278,223,000. All of these, he said, have been paid except $223,073, representing bad debt losses of less than one-twelfth of one per cent. He declared that few banks lending money for purchasers' credit could point to such a good loss record for the same period, despite these were prosperous years.

Loss Less in Recent Years

While the 1925 and 1926 experience figures are not yet available in their entirety, the credit losses to date on $444,573,000 of consumers' obligations purchased from Jan. 1, 1925, to Oct. 1, 1926, aggregate $135,322, or about one-thirtieth of one per cent, Mr. Raskob said:

"Very few people realize how important a factor the automobile industry has been in the prosperity of this country," said Mr. Raskob. "Yet if we stop to think about it, it is obvious that without the stimulation which the rapid growth of this industry has given to numerous other industries, and to business in general, the country could not have enjoyed so great a degree of prosperity as it has enjoyed in recent years, and there would have been less employment of labor, a smaller aggregate consumer purchasing power and a lower standard of living."

Australians Oppose £134 Bounty a Car

Duplicating American Chassis by National Company Too Costly Say Trade Heads

SYDNEY, AUSTRALIA, Oct. 10 (*by mail*)—Argument against the attempt to locate an Australian automobile manufacturing industry through the granting of a bounty was presented before the Tariff Board here by C. H. Koster as chairman of the New South Wales Chamber of Automotive Industries, and by A. E. Plant, representing the British section of the chamber.

As an aid to the proposed industry the Tariff Board had been asked to grant a bounty of £134.10 per car, this being the approximated difference in cost of duplicating in Australia a £100 chassis of American manufacture. On a proposed production basis of 5000 cars yearly the total bounty would be £672,500 yearly it was shown, which would be taken from the tariffs collected on imported cars. The bounty was to continue in gradually diminishing amount until such time as the Australian company's production volume would enable it to compete equally with American manufacturers.

The proposal to build cars in Australia came from manufacturers of various metal parts, some of whom were already building automobile parts for replacement or equipment on imported stripped chassis. These were to specialize in the manufacture of automobile units which would be assembled and sold by a new company to be known as the National Motor Car Mfg. Co., Ltd., which also would build additional plants for manufacture of such other parts not already available. The parts building companies would be shareholders in the central company.

Copy Car to Save Costs

The car to be built was a standard American six-cylinder car, the chassis of which sold for about £100 wholesale price in the United States. It was proposed to disassemble this car and make all drawings from the parts to save designing costs. The name of the car was not disclosed but its general specifications were shown to be 22 to 25 hp. with bore and stroke of 3⅛ x 4½, 115 in. wheelbase, standard track of 4 ft. 8 in. and four-wheel brakes.

Opposing the proposition Mr. Kloster pointed out that the Australian company, as manufacturer of a complete car in this price class would have a total protection per car of £171 approximately, and with the retail sales price considered this would be increased to over £200. The cost of meeting this bounty on 5000 cars yearly, he said, would be too much for Australians to pay for the finding of employment for 1000 persons.

From a manufacturing point of view, Mr. Plant said it was extremely doubtful that the company would be able to reach a production of 5000 cars yearly in the second year as contemplated. He expressed doubt that a company with no automobile manufacturing experience could even get into production on a commercial scale in two years. By the time it did get into production, he said, the car would be out of date.

PARIS SHOW DRAWS 400,000 ATTENDANCE

WASHINGTON, Nov. 17—More than 400,000 persons witnessed the automobile salon, recently held in Paris, according to a detail report on the exhibit just received by the Department of Commerce from H. H. Kelly, trade commissioner at Paris.

Mr. Kelly states that American exhibitors concentrated on showing their wares to European dealers attending the exhibit, rather than on French sales. There were 37 American exhibits, all of which reported a good volume of sales, Mr. Kelly says.

Popularity of fabric bodies and interest in American imitation leathers were among the features noted in Mr. Kelly's report.

Chrysler Sets Mark With October Sales

DETROIT, Nov. 15—Chrysler Corp. in its report for October shows production to have reached 22,124, a new high production mark for any single month. Production in September totaled 18,761, and in October, 1925, 14,632. September, 1926, was the previous record month.

Retail deliveries of Chrysler cars in the first 10 months of the year were 103 per cent more than the total last year. Unfilled orders on Nov. 1, were pointed to by the company as forecasting a continuance of record business.

Delco-Light Sales Grow

NEW YORK, Nov. 15—October sales of electric light and power plants and water systems by the Delco-Light Co., subsidiary of General Motors Corp., were 12 per cent greater than for October, 1925, E. G. Biechler, president and general manager announced.

More water systems were shipped during the first 10 months of this year than during the whole of 1925, the best previous year in the company's history, said Mr. Biechler.

Link-Belt Opens 36th

INDIANAPOLIS, Nov. 15—Link-Belt Co. has established a sales and service office in New Haven, Conn., in charge of R. H. Hagner, formerly of the Philadelphia office. This is the thirty-sixth office of the company.

Star of California Drops Distributors

Will Use Multiple Dealer System to Increase Sales and Service

OAKLAND, CAL., Nov. 15—As the first move in the expansion program of the Star Motor Co. of California, R. H. Mulch, recently named vice-president and director of sales, announces the elimination of the distributor system, and the immediate inauguration, effective today, of the multiple dealer system in all territory on the mainland side of San Francisco Bay.

This territory includes the cities of Oakland, Berkeley, Alameda, Emeryville, San Leandro, Hayward, Albany, Piedmont and Richmond, which formerly had one general distributor of Star cars, the retailers operating under him. Population of this area, with tributary territory, is upwards of 750,000, and the distributor holding the Star car franchise in this city controlled the entire mainland side of San Francisco Bay through associate dealerships.

Three direct dealers now will handle this business, announcement of the change coming from Mr. Mulch through the office of Norman de Vaux, active head of the Star factory. Under the new multiple dealer system, it is announced that each dealer will be obliged to maintain and operate a complete Star service and repair department, as well as carry a complete stock of parts, equipment and accessories. The California Auto Sales Co. becomes the central Oakland dealer, functioning directly under Mr. Mulch and his staff.

This arrangement makes a fairly even division of the territory in what is known as the East Bay, which is to San Francisco about what Brooklyn is to New York City. Mr. Mulch is of the opinion that the multiple-dealer system will provide better and more thorough distribution for the factory product and wider and more comprehensive service for owners.

Stevens Walden-Worcester Now in Worcester Plant

WORCESTER, MASS., Nov. 15—Consolidation of Stevens & Co. with Walden-Worcester, Inc., was formally completed with the closing of the New York business home of the former company and its removal here to the plant of the new Stevens Walden-Worcester, Inc. All shipments of the products of the combined companies will now be made from the Worcester plant, which also will house the combined staffs of the two companies.

The export division of the new company will remain in New York, occupying a part of the former Stevens & Co. offices at 375 Broadway.

Men of the Industry and What They Are Doing

Noted European Racer to Drive at Los Angeles

Albert Divo, chief of the Sunbeam-Talbot-Darracq racing team, will take part in the 250 mile race on the Los Angeles track, aboard a Miller car. Divo, who is under a contract with the Franco-British firm, has been released by special consent of Engineers Coatalen and Clegg and will cross the Atlantic for the first time.

Trained as a mechanician under Rene Thomas, Divo got his first important racing experience aboard Sunbeam cars, finishing second in the French Grand Prix of 1923 to his teammate Segrave. He also finished second on a Delage in the French Grand Prix of 1924 and this year won the 200 mile race on Brooklands track at the wheel of a French Talbot car.

H. O. Smith Talks to A.M.A.

The annual sales conference and dinner of the Automotive Manufacturers' Association was held last night at the Palmer House. The speakers were H. O. Smith, chief of the automotive division of the bureau of foreign and domestic commerce, Department of Commerce; Arthur D. Welton, economist, and Sidney J. Stern. About 150 members and guests attended. G. F. Disher, president of the association, presided.

Logie Named by Marmon

Louis Logie has been appointed manager of the eastern coast sales district, Maryland to Florida, by Marmon Motor Car Co., succeeding L. F. Johnson, who resigned to enter work outside the industry. Mr. Logie has been connected with the industry for a long period, being one of the first employees of Ford Motor Co.

Major Schroder Resigns

Major R. W. Schroder, superintendent of the Ford Airport, Dearborn, and the various Ford airlines, also chief test pilot of the company, has resigned from the Ford Motor Co., it is learned. Major Schroder's plans for the future have not been announced. As successor E. G. Hamilton, one of the original Ford pilots, has been appointed. Mr. Hamilton has been test pilot for the Stout planes.

Battey Succeeds Irvin

Paul T. Irvin has resigned as manager of the small tool department of the Greenfield Tap & Die Corp. to take over direction of sales for Bemis & Call, wrench manufacturers, of Springfield, Mass. Louis Battey has been appointed to succeed Mr. Irvin at the Greenfield company.

WEYMANN TO VISIT NATIONAL EXHIBITS

Charles T. Weymann, inventor of the Weymann flexible fabric leather body, will sail for New York on the Olympic, Nov. 24. During his stay in the United States Mr. Weymann will visit the New York and Chicago shows, and will spend considerable time at Indianapolis in connection with the work of the recently-formed American Weymann Body Co.

Cornely Named President

The Automotive Equipment Manufacturers and Distributors Association, at its annual meeting and banquet in San Francisco, named E. A. Cornely as president. Harry D. Schroder was chosen vice-president; L. B. Carpenter, treasurer; Elliott Epsteen, secretary; Samson J. Stern, ex-officio, and Walter R. Malm, member of the board of directors. Robert W. Foyle was re-elected to the chairmanship of the board of directors.

Frederick Talks to S. A. E.

W. A. Frederick, chief engineer of Continental Motors Corp. of Detroit, described the operation and advantages of the single sleeve valve engine at the meeting of the Metropolian Section of the Society of Automotive Engineers at the Hotel Woodstock. The talk was illustrated by stereopticon views.

Rubber Trade Names Officers

The Rubber Trade Association of New York held its annual meeting and election of officers at the Reford Club. Officers for the coming year are: President, F. Pusinelli; vice-president, D. D. Haldane; treasurer, R. L. Chipman, and secretary, J. P. Sullivan.

E. A. Halbleib Convalescing

Edward A. Halbleib, vice-president and general manager of the North East Electric Co., is convalescing at his residence following a serious operation. He expects to be back at his desk at the North East plant in a few weeks.

Durant Promotes Kerby

Roy D. Kerby has been appointed general manager of Durant Motors of Canada, Ltd., according to a report from Toronto. Mr. Kerby has been affiliated with the automotive industry since 1913, serving with General Motors of Canada, at Oshawa, as sales manager of Oakland, Oldsmobile and Cadillac. He joined Durant in June, 1925, as sales manager.

Indian Motocycle Names Executive Committee Head

Louis E. Bauer, of Springfield, Ohio, has been elected a member of the board of directors of the Indian Motocycle Co. and also has been appointed chairman of the executive committee, these arrangements to take effect at once. Frank J. Weschler, president, in announcing the appointment, expressed satisfaction that a man of Mr. Bauer's capabilities had been added to the Indian organization. Mr. Bauer is president of the Springfield (Ohio) Leather Products Co. and vice-president of the Bauer Bros. Co., manufacturer of grinding machinery in the same city.

Beebe Moved to Chicago

J. F. Beebe, formerly in charge of the Des Moines district office of Durant Motors, Inc., has been appointed Chicago zone manager for the Durant company, in charge of Star and Flint sales. Before joining Durant Mr. Beebe was for 13 years connected with the Ford company. Mr. Beebe was succeeded in the Des Moines district by J. W. DeBow, formerly in charge of Durant interests in the western provinces of Canada.

Ulmstead Heads Branch

W. L. Ulmstead, Philadelphia salesman for the White Co., has been made manager of the branch recently opened at Harrisburg, Pa. Norman Robles has been appointed district manager at Boston and the branch office at Worcester, Mass., has been made the district office.

Packard Company Reelects Officers and Directors

DETROIT, Nov. 13—Stockholders of Packard Motor Car Co. held their annual meeting this week and reelected all of the directors of the company. The directors, in turn, held their annual session and reelected all officers.

The directors are Frederick M. Alger, Russell A. Alger, Henry Bodman, Richard P. Joy, Alvan Macauley, James T. McMillan and Truman H. Newberry.

The officers are Alvan Macauley, president; Russell A. Alger, vice-president; Richard P. Joy, treasurer, and M. A. Cudlip, secretary.

Grange Backs State Control

PORTLAND, ME., Nov. 13—At the session of the National Grange here this week, Dr. T. C. Atkeson, representative in Washington, presented for consideration a resolution based upon his stand before the Federal Government opposing regulation of trucks on highways. He argued that such control belonged to the states. The National Grange upheld his contention and favored his report.

U.S.C.C. Urges End of War Excise Tax

Program Requests Elimination of All as Rapidly as Treasury Permits

WASHINGTON, Nov. 16—Immediate repeal of the 3 per cent automobile excise tax, and all other war-time excise taxes, was urged on President Coolidge this week by a delegation of the United States Chamber of Commerce, outlining the legislative program which the nation's business interest, as represented by the Chamber, wishes the administration to adopt.

Included in the program, in addition to removal of the automotive tax, were recommendations for enactment of the McFadden-Pepper bill to recharter the Federal Reserve banks, ratification of the French debt settlement; reduction of the present revenue law affecting corporations and estates; passage of a bill to increase salaries of Federal judges, and changes in the railroad laws to facilitate consolidations.

Touching on the excise taxes, the committee's program says: "Great strides were made in the elimination of excise taxes and taxes on particular businesses which were imposed as a means of raising revenue for the great war. We firmly believe that such taxes ought to be repealed as soon as the state of the treasury allows, for while they are absolutely justified as war measures they do not belong in a peace-time tax program."

Representative John N. Garner, ranking Democrat of the House Committee on Ways and Means, commenting on the President's tax program, declared that he favored repeal of the automobile tax first of all. "I believe the Government should repeal the automobile tax first, then all the remaining nuisance taxes next and then take what we can off of the corporation taxes."

Buhl-Verville Aircraft Takes Marysville Plant

DETROIT, Nov. 15—Manufacturing operations of the Buhl-Verville Aircraft Corp., have been transferred from their recent location in the Buhl Metal Stamping Co. plant to Marysville, where the Illinois Tool Co. plant, with 20,000 ft. of floor space, has been leased.

Coincident with this announcement it is learned Alfred Verville, designer of the "Airster" planes manufactured by the Buhl-Verville Airplane Co. and also designer of two winning planes in the Pulitzer Races, has resigned from the company. Mr. Verville's future plans have not yet been completed, but it is understood he will announce his connection with a new important aviation enterprise.

The personnel of the company includes Lawrence B. Buhl, president; Herbert Hughes, general manager, formerly in charge of Government aircraft construction at Packard; Louis G. Meister, sales manager and test pilot, and George Arnold, superintendent of production.

C. G. Spring-Bumper Shows $547,719 Net

DETROIT, Nov. 15—The number of bumpers shipped by C. G. Spring & Bumper Co. in its fiscal year closed Aug. 31, 1926, totaled 1,074,641 as against 679,962 in the previous year and 532,189 in the 1924 period, reports Christian Girl in his statement to stockholders. Net profit of the company was $547,719 as against $460,934 in the 1925 fiscal year.

The balance sheet shows total current assets of $949,090 against current liabilities of $344,137. These compare with $781,734 and $222,336 respectively in 1925. Cash of $113,064 is a decrease of $2863; notes receivable of $24,109 is an increase of $21,361, and accounts receivable of $420,462 is an increase of $116,646. Inventory of $391,463 is an increase of $32,211.

Assets of the company total $2,646,216, an increase of $704,310 and surplus totals $1,157,733, an increase of $415,328.

British Tire Exports Show Increase in 1925

WASHINGTON, Nov. 16—British exports of rubber manufacturers in 1925 were valued at £9,037,206 as compared with £7,491,708 in 1924, according to statistics just compiled by the Rubber Division of the Department of Commerce.

Automobile casings, valued at £2,275,688 formed the largest single item in the list in 1925, while inner tubes were valued at £648,460. Both showed increases over the 1924 marks. Solid tires, valued at £7002 in the export figures for 1925, showed a decrease under the 1924 figure, which was £11,646.

Discusses Gas Welding

CHICAGO, Nov. 12—The twenty-seventh annual convention of the International Acetylene Association closed here tonight with a banquet at the Congress Hotel. Sessions were held Wednesday, Thursday and Friday. The subject of gas welding occupied a considerable part of the program.

Air Mail Bids Sought

WASHINGTON, Nov. 18—Proposals for the taking over of the air mail routes between New York and Chicago and between Chicago and San Francisco were issued this week by the Post Office Department. The routes are open to all bidders regardless of residence, the closing date for acceptance of bids being Jan. 15, 1927.

Financial Notes

Wright Aeronautical Corp. for quarter ended Sept. 30, 1926, shows net profit of $131,775 after taxes, equivalent to 52 cents a share earned on outstanding 249,390 no par shares of stock. This compares with $123,148, or 40 cents a share, in the preceding quarter and $162,509, or 65 cents a share, in third quarter of 1925. Net profit for the first nine months of 1926 totaled $454,924 after taxes, equal to $1.82 a share, compared with $517,760, or $2.07 a share, in same period of previous year.

E. I. du Pont de Nemours & Co. declared an extra dividend of $5 in addition to a quarterly dividend of $1.75 on common, placing the new common stock on a $7 annual basis. Regular debenture dividend of 1½ per cent was also declared. Extra dividend is payable Jan. 5 to stock of record Dec. 1. The quarterly dividend on the common is payable Dec. 15 to stock of record Dec. 1. Debenture dividend is payable Jan. 25 to stock of record Jan. 10.

National Acme Co. reports net earnings of $238,489 after all charges including bond interest and depreciation for the nine months ended Sept. 30. A loss of $40,223 was encountered during the third quarter. In July the company noted a loss of $64,000 after unusually heavy expenses including inventory shrinkage had been written off. However, there was a net profit of $1825 in August and $22,000 in September.

Radio Corp. of America in its statement of operations covering the quarter ended Sept. 30 reports gross income from sales, communications and other income at $14,734,110. Deductions for general operating and administration expenses, depreciation, etc., totaling $12,618,019, leaves surplus profits of $2,116,090 for the quarter. Surplus profits for the nine months ended Sept. 30, 1926, totaled $3,986,621.39.

Doehler Die Casting Co. reports for nine months ended Sept. 30, 1926, net income of $502,290 after Federal taxes, equivalent after allowing for dividend requirements on 7 per cent preferred stock, to $3.13 a share earned on outstanding 150,000 no par shares of common stock. This compares with $282,691, or $1.66 a share, in first nine months of 1925.

Stewart-Warner Speedometer Corp. shows net profit of $4,808,350 for the nine months to Sept. 30, equivalent to $8.01 a share earned on the 599,990 shares of no par stock. The total compares with $5,373,336, or $8.95 a share in the same period of 1925. For the September quarter net profit was $1,686,535 as against $1,906,364 in the same quarter last year.

Packard Motor Car Co. declared in advance regular monthly dividends of 2 per cent on common stock for each of the three months, December, January and February. Dividends are payable on the last day of each month to stockholders of record on the preceding fifteenth day.

Eaton Axle & Spring Co. balance sheet as of Sept. 30 shows cash of $234,154; accounts receivable, $775,000; inventories, $2,048,000; total current assets, $3,088,056; plant, $4,364,277; total assets, $8,810,281; current liabilities, $674,647; reserves, $81,880.

Third Tire Revision Ranges 5 to 15%

Prices Now Approximate Lowest Levels—Reductions Laid to Competition

AKRON, Nov. 18—Automobile tire and tube prices now are at practically the lowest level in the history of the industry as result of the third substantial price cut this year, effective Nov. 15.

Although the action had been expected and other large manufacturers were preparing for it, the Firestone Tire & Rubber Co. was the first to definitely announce a reduction of 5 to 15 per cent. The new schedules, which represent an average decline of about 11½ per cent on all lines of casings and tubes, were followed by Goodyear, Goodrich, United States, Fisk, Miller and other companies. Previous reductions of 10 per cent on Feb. 3 and about 12 per cent on July 5 were made this year. The total decline virtually wipes out the price advances of last year.

While the price of cotton fabric has seldom played much of a part in tire prices, it is doubtful if the latest reduction could have been more than 5 per cent except for the low fabric prices prevailing. The cost of fabric going into an average casing is estimated to be not quite 5 per cent less than what it was a year ago.

Several reasons have been advanced by Akron observers for the new revision, but the basic cause seems to be keen competition. When he announced his price cut, Mr. Firestone remarked that his company had been able to obtain a large quantity of rubber at about 37 cents a pound some months ago, about 5 cents lower than the present market. Other manufacturers say they have some of the cheaper rubber, also, but none of them probably has more than a three or four months' supply.

One reason given for the move is that influential dealers expressed their unwillingness to enter into the manufacturers' spring dating program unless a lower price scale was fixed. As the dating plan also went into effect Nov. 15, there can be no change in present prices until Feb. 15 or later, the new schedules being guaranteed for three months.

On the basis of lower prices and estimated larger consumption of tires next year, dealers are expected to place large orders for shipment during the latter part of this month, December, January and February. Final payment on the shipments is made in March and April, when most of the surplus stock will be sold.

Need Secondary Highways

WASHINGTON, Nov. 13—The Asphalt Paving Conference closed its fifth annual meeting here this week with the adoption of a resolution calling on Congress and state legislatures to give consideration to the upkeep of secondary roads throughout the country. Public officials were commended for the state and Federal aid in promoting highway construction of primary highways but it was the consensus that these primary highways will not be sufficient in the immediate future to care for the country's transportation problems.

October Sales Fall 13% in New York

NEW YORK, Nov. 13—October new car sales in the Metropolitan area declined slightly more than 13 per cent below September. Total registrations were 8490 as compared with 9760 in September and 11,135 in August. The total for the month is lower than for October, 1925, which was 9037 but was in excess of October, 1924, which was only 6531, according to figures supplied by Sherlock & Arnold.

October Metropolitan area totals of 35 medium priced cars, including Ford, were 7450 as compared with 7966 in October, 1925; 5938 in October, 1924, and 5572 in October, 1923. Totals for this same group of cars for the first 10 months of this year were 100,574 as compared with 81,879 for the same period in 1925; 79,202 for 1924, and 72,-184 for 1923.

In the higher priced field, October sales this year declined less than 3 per cent below the level for October, 1925. The total for 22 cars in this classification was 1040 as compared with 1071 for October, 1925; 593 for October, 1924, and 801 for October, 1923. The total for the first ten months, 11,082, shows a gain of more than 34 per cent over the corresponding period for last year, when the total was 8277.

Investigate Beryllium

WASHINGTON, Nov. 16—Scientific research for a new metal, known as beryllium, which is lighter than aluminum, is being made by the U. S. Bureau of Standards. Partial success has already been made in the laboratory tests, the bureau announces. Officials declare that a properly alloyed beryllium would be of great value in aircraft and automobile engineering, or any other mechanical field, where great strength, coupled with lightness and minimum of expansion under heat is essential. The government will make available to industries interested the results of the beryllium investigation.

Graybar Expands Branches

DETROIT, Nov. 15—Graybar Electric Co. has moved its Detroit distributing branch to larger quarters at 55 West Canfield Street. The opening of larger quarters here is declared by the company to be part of a general policy of expanding all distributing branches to care for increasing business.

Tire Dealers to Buy With New Price Cut

Stocks to be Brought to Normal But Not Exceeded, Says Association

NEW YORK, Nov. 15—Tire dealers' inventories are much lower now than they were at this time last year but they are expected to be materially increased by buying following manufacturers' price reductions already announced and expected within the week, George J. Burger, secretary-treasurer of the National Tire Dealers Association, said today. Resumption of the spring dating plan also is expected to stimulate dealer purchases, he said.

The price factor, however, is unlikely to effect a greater volume of orders, Mr. Burger explained, because dealers generally are not inclined to exceed a predetermined maximum regardless of the decline. Orders will be placed in the immediate future in accordance with dealers' requirements, because of the protection afforded them by the guarantee against further reductions, up to April or May, and because of the obvious advantages of long credit rather than because of lower prices, Mr. Burger said.

The general impression among dealers is that too much of a drop in tire prices now will result in comparable increases in the spring, he pointed out.

Mr. Burger, with nine local dealers and a party of Boston dealers, is attending the convention of the N. T. D. A. in Memphis this week.

Urges Grade-Crossing Laws

WASHINGTON, Nov. 17—The American Automobile Association has sponsored a national, concerted movement, to be inaugurated with the convening of 43 of the 48 state legislatures this winter, to reduce the number of grade crossing fatalities in the United States—fatalities which, according to an announcement by Thomas P. Henry, president of the A. A. A., numbered 10 per cent of all the fatalities in street and highway accidents last year. Much that could have been done to protect lives at grade crossings is not done because of lack of concerted action, Mr. Henry states. He believes the program which the A. A. A. now is mapping out will do much to minimize the evil.

"Hawk" Ends Test Flight

WASHINGTON, Nov. 17—A Curtiss "Hawk," one of the Navy's latest fighting planes, equipped with a Pratt-Whitney 400 hp. radial air-cooled engine, has just completed a round-trip coast-to-coast flight as a test by the Bureau of Aeronautics, the Navy Department has announced. Flying time for the round-trip, which was completed without mishap, was 65 hours for approximately 7000 miles.

Uncertainty Marks Steel Price Course

Automotive Purchasing Agents Delay Sounding Market—Mills Hold Gage Base

NEW YORK, Nov. 18—So far as automotive demand is concerned, the steel industry is still waiting for the curtain to rise on a fresh buying movement. This is expected to be slow at first but looked for to broaden gradually. Here and there, steel previously contracted for is being specified against and ordered forward and every increase in this activity is taken as a prelude to new buying. So far, however, automotive purchasing agents have refrained from sounding the market with reference to new commitments.

Following opening of its first quarter 1927 order books at previously quoted prices, by the leading interest's sheet-rolling subsidiary, producers generally let it be understood that there would be no deviating from the prices promulgated in September when the gage base was changed. Consumers still look upon these price levels more or less as asking prices because no representative tonnages have been contracted for since they went into effect, but there is little question that both the larger as well as the smaller independents are determined to conserve what slight advantage accrued to them from the change in the base gage.

Non-integrated rollers of full-finished automobile sheets as well as cold-finishers of steel bars and strip steel continue to complain of the inadequate spread between the cost of their raw material, sheet bars, billets and slabs on the one hand and the prevailing market prices for their finished products on the other. With the sales volume temporarily impaired because of the lull in automotive buying, this scant margin between semi-finished and finished steel is a more vexing problem for the finishing mills than when they can make up through volume operations for relatively slight profits per ton.

Makers of forging quality steel have felt the let-down in automotive demand keenly. Some finishing mills look for quickened inquiry from automotive consumers next week, on the theory that material for January schedules must be provided for before the end of the month.

Pig Iron—With the fuel situation much easier, the incentive to a bullish attitude has been weakened, and the pig iron market has turned rather dull.

Aluminum—German advices state that one of the leading producers has been able to reduce his selling price by more than 10 per cent through economies resulting from hydro-electrical power installation. The Continental producers are reported to be about to form a closely knit combine which will not stop with the crude metal, but will also vigorously prosecute the upbuilding of the aluminum rolling industry. German interests appear determined to take a more active part in the American market, even though by refraining from this they might strengthen their position nearer home. The market rules quiet and unchanged.

Copper—The market is a shade firmer. Automotive demand for copper and brass products is light.

Tin—Almost daily somersaults on the London Metal Exchange serve to keep domestic consumers out of the market for any but immediate needs.

Lead—The general impression is that the market has reached bottom. Storage battery interests have bought freely of late.

Zinc—Fair demand is noted.

Bids for Steel Cabs Range $262 to $1490

WASHINGTON, Nov. 16—Bids for 100 steel armored cabs for Post Office Department mail trucks, just opened in Washington, ranged from $262.08 to $1490 each, with estimates on steel bodies ranging from $219.85 to $540. The following are the bidders and the prices quoted for the cabs:

The Manhattan Body Co., New York, $758; Gustav Schaefer Wagon Co., Cleveland, $765 each; Shunk Mfg. Co., Bucyrus, O., $1035; Standard Auto Radiator Co., New York, $885; Van Dorn Iron Works, Cleveland, $619.30; George B. Marx, Brooklyn, $674.25; Kratzer Carriage Co., Des Moines, $916.79; Fitz Gibbon & Crisp, Trenton, N. J., $989; Wm. H. Hoffman, Cleveland, $569; General Body Co., Defiance, O., $262.08; Metropolitan Body Co., Bridgeport, Conn., $710; Veneema & Wiggers Co., Paterson, N. J., $671.10; Eddystone Steel Co., Crum Lynne, Pa., $720; Fred Roeder Mfg. Co., Brooklyn, $1490; National Steel Products Co., Kansas City, $774; Fisher Motor Body Corp., San Francisco, $664, and A. E. Rainey, Westminster, Md., $885.

According to specifications, the entire outside of the cabs is to be covered with armored or bullet-proof steel plate or bullet-proof glass. The armor steel is to be of No. 16 gage.

North East Builds Typewriter

ROCHESTER, Nov. 13—Production on a large scale of an electrically operated typewriter, perfected by engineers of the North East Electric Co., has started at the plant here. The machine is being marketed by the Remington Typewriter Co., the electrical mechanism being made here and then sent to the Remington factory where the standard keyboard is installed.

Although many patents have been taken out on power-driven typewriter mechanisms the North East company claims to have developed the first commercial power-driven equipment for operating all features of the typewriter.

Australian Premier Scores British Cars

Says Prices Are Too High and Many Unsuited for Overseas Market

LONDON, Nov. 2 (*by mail*)—S. M. Bruce and J. G. Coates, respectively prime ministers of Australia and New Zealand, made the tour of Olympia accompanied by Sir Philip Cunliffe-Lister, president of the British board of trade. The first named was free in his criticism as to the fitness of British automobiles to cope with overseas requirements.

One maker was told that his vehicle was quite unsuitable to do the rough work required in Australia, and he suggested that makers would find it advantageous if they went there to try out their cars.

Altogether, 28 British cars were inspected. Only half of these had tracks of 56 in., while but four had a ground clearance of 9 in.

Prices, Premier Bruce said, were too high, but he thought British makers were getting down, if but slowly, to overseas needs in automobiles.

Standards Bureau Studies Cold Weather Lubrication

WASHINGTON, Nov. 16—The United States Bureau of Standards is calling to the attention of automobile engine manufacturers tests which now are being conducted at the bureau of lubrication, of aircraft engines at low temperatures. The bureau states that the tests will prove of particular advantage to automobile engine manufacturers as an aid to solving the problem of lubrication in cold weather.

Particularly, attention is being paid in the tests to the dimensions of the pump and the feed lines, so as to make them adequate for sufficient lubrication, and yet provide against over-cooling when temperature conditions are such that oil flows freely.

Aircraft Fund Adequate

WASHINGTON, Nov. 13—The five-year aircraft building fund already authorized by Congress is "entirely adequate to meet all the best interests of national defense and no new appropriations should be made beyond it," Representative Martin B. Madden, of Illinois, chairman of the House Appropriation Committee, declared after a conference with President Coolidge on appropriation bills for the next session of Congress.

LeRoi Motor Builds

MILWAUKEE, Nov. 15—The LeRoi Motor Co. is building an addition to its works to relieve the pressure on several departments. Charles W. Pendock is general manager.

Olympia Attendance Reaches New Record

Total of 264,445 is 70,000 More Than 1925—British Manufacturers Encouraged

LONDON, Nov. 1 (*by mail*)—The largest attendance ever recorded at the Olympia passenger car show is represented by the figures available this morning concerning the exhibition just closed. As will be seen by the table below, the attendance on no one day fell below 20,000. In addition to the aggregate of 264,445 is the attendance on the day before the official opening; although this ostensibly was confined to members of the press and dealers, it was apparent this year that large numbers of private buyers were among the 15,000 to 16,000 present. The total receipts for the eight public days were £48,146.

Outside the ranks of exhibitors, the opinion is widely expressed that the period of the show should be extended to at least a fortnight, while in the lay press the need for it to be open for three weeks or even a month is widely expressed. It is said that owing to the reports of overcrowding—for Olympia was assuredly overcrowded on every day except one—large numbers of people in all parts of England refrained from attending. According to the report of an interview published in today's "Daily Mail" a "famous American motor manufacturer (name not specified) stated on Saturday, 'in New York a show of these dimensions would run for at least a month. While, in my opinion, it is the most remarkable motor show in the world, it is definitely marred by the crowding and the difficulty of making a really close inspection. Congestion causes irritability, which means less business.'"

1923 Biggest Former Year

The following are the attendance figures officially issued as to the show just closed and those of the three preceding years:

	1923	1924	1925	1926
Friday ...	15,129	16,093	16,409	21,845
Saturday .	31,389	26,756	28,431	43,407
Monday ..	22,194	17,728	19,267	25,708
Tuesday ..	25,274	19,347	20,920	27,494
Wednesday	31,931	24,220	26,525	37,070
Thursday..	25,595	20,802	22,698	30,458
Friday ...	32,150	31,041	31,433	40,251
Saturday..	27,386	24,589	28,376	38,212
	211,048	180,576	194,059	264,445

With regard to the business done at Olympia the majority of exhibitors express satisfaction, for although the number of private orders actually placed with manufacturers was negligible in proportion to the total number of cars likely to be sold next year by British makers and importers, dealers from all parts of the country (who were themselves in attendance or had representatives at the exhibits of every car they handle) are extremely optimistic. It is these dealers, not the makers or exhibitors, who book the vast majority of private orders that are placed at the show, and nearly all of them report a record number of orders and prospects.

From the British standpoint the most pleasing aspect of the show period has been the better promise in regard to the export trade, and many manufacturers are anticipating a 50 per cent increase in this direction for 1927 and one or two speak of doubled sales overseas next year.

Shows Dodge Sales 45.1 Per Cent Cash

DETROIT, Nov. 11—A survey of instalment buying of motor cars by R. P. Fohey, treasurer of Dodge Brothers, Inc., shows that 45.1 per cent of the buyers of Dodge Brothers motor cars pay cash. This total was reached by analysis of 39,095 sales of new cars in all parts of the country over a period of several months. The percentage ranged from a low of 23 per cent to a high of 65.

In the New York district instalment buying was found more prevalent than in the Omaha district, which embraces many small towns and rural territory. Canadian dealers reported cash sales averaging 51 per cent, or 6 per cent higher than the average for the United States.

Another interesting point developed by Mr. Fohey was that of sales by the factory to dealers exceeding $1,500,000,000, loss through bad debts totaled only $33,000.

McQuay-Norris to Sell Nelson Piston to Trade

CHICAGO, Nov. 12—Distribution of Nelson-Bohnalite pistons to the replacement trade will be handled by the McQuay-Norris Mfg. Co., according to an announcement made at the Automotive Equipment Association show. They will be packed and sold in the same manner as other parts distributed by this company.

The Nelson-Bohnalite piston is an aluminum type but is unique in that it has two cast-in alloy steel struts which limit its expansion and maintain clearances constant. It is used as regular equipment by a number of important car manufacturers.

Varnish Output Higher

WASHINGTON, Nov. 13—An increase of 10.7 per cent in production of varnishes, japans and lacquers and of 62 per cent in the production of pyroxylin varnishes is reported by the Department of Commerce in its semi-annual survey of the paint and varnish industry. While the varnish and lacquer production was increasing during the six months ended June 30, paste paints decreased 6.8 per cent.

G.M. October Sales Exceed 1925 Totals

Shipments to Dealers and Retail Movement Continue in High Volume

NEW YORK, Nov. 15—General Motors Corp. reports that October sales of cars by the manufacturing divisions to dealers totaled 115,849, compared with 96,364 in October last year and with 49,552 in October, 1924.

Sales by dealers to users in October were 99,073, compared with 86,281 in October last year and with 46,003 in October, 1924.

For the ten months ended Oct. 30, sales to dealers were 1,112,170, compared with 708,411 in 1925, an increase of 57 per cent. For the same period, retail sales by dealers to users were 1,061,368, compared with 701,670 in 1925, an increase of over 50 per cent.

This would leave a surplus of 50,802 between factory sales and dealer sales, representing dealer stocks and cars in transit. In six months of the year to date shipments to dealers have exceeded retail deliveries. Sales by months follow:

Divisions Sales to Dealers

	1926	1925	1924
Jan.	76,332	30,642	61,398
Feb.	91,313	49,146	78,668
Mar.	113,341	75,527	75,484
April	122,742	85,583	58,600
May	120,979	77,223	45,965
June	111,380	71,088	32,984
July	87,643	57,358	40,563
Aug.	134,231	76,462	48,614
Sept.	138,360	89,018	51,955
Oct.	115,849	96,364	49,552
Nov.	.....	73,374	23,631
Dec.	.....	54,117	19,927

Dealers Sales to Users

	1926	1925	1924
Jan.	53,698	25,593	33,574
Feb.	64,971	39,579	50,007
Mar.	106,051	70,594	57,205
April	136,643	97,242	89,583
May	141,651	87,488	84,715
June	117,176	75,864	65,224
July	101,576	65,872	60,836
Aug.	122,305	78,638	54,842
Sept.	118,224	83,519	48,565
Oct.	99,073	86,281	46,003
Nov.	.....	60,257	33,095
Dec.	.....	56,129	33,919

Gasoline Sales Gain 15%

NEW YORK, Nov. 15—Gasoline consumption in 31 states, as indicated by reports made by wholesalers and dealers in various states, under provisions of gasoline tax or inspection laws, during nine months ended Sept. 30, totaled 3,067,723,000 gal. against 2,667,612,000 gal. in the 1925 period, a gain of 400,111,000 gal. or 15 per cent, according to the American Petroleum Institute. Gasoline consumption in the same states in September totaled 392,882,000 gal., against 355,817,000 gal. in same month last year, an increase of 37,065,000 gal., or 10.4 per cent.

Better Battery Use Aim of Association

Will Direct Educational Work to Public and Dealers—Studies Bus Batteries

DETROIT, Nov. 13—Problems of battery dealers and distributors as well as those of battery manufacturers will be given more serious attention in the future by the National Battery Manufacturers Association, it was indicated in discussions at the convention held at the Book-Cadillac Hotel here this week.

According to reports on business, the battery industry is enjoying its greatest year, and with the outlook bright for coming months, the manufacturers evidenced that they would next turn their attention to improving a number of details which have been neglected.

Among issues scheduled for further action are proposals to further standardize battery specifications, manufacturing operations and service methods; the working out of more uniform shipment packing containers; a two-fold educational program to better acquaint dealers with essentials to more intelligently merchandise batteries, and to educate the public more fully on what constitutes a good storage battery, the functions of the battery and its care.

While the battery industry has eliminated a number of sizes of batteries during the past two or three years, the industry would do well to give further serious thought to the idea of more complete standardization in the industry, Edwin W. Ely, assistant director, National Metals Utilization Committee, Department of Commerce, told the convention.

Cites Ways to Savings

The battery industry could concentrate more closely on the sizes and types of machines used in the factories, much could be accomplished by eliminating waste in packing cases and plans could be worked out where fewer tools and less equipment would be required in servicing batteries, said the speaker.

H. A. Harvey, chairman of the publicity committee, told the convention that plans are about completed whereby the association will prepare a series of 26 articles to give the public a clearer conception of what constitutes a good battery, its function and how to take care of it. Later the battery dealers will be circularized with literature pointing out to them many essentials which should assist them materially in marketing their product, especially the higher grade batteries.

The stand the association took a year ago against the misbranding of batteries, has won the approval of the National Better Business Bureau, and the bureau is seeing that it is being enforced in a substantial manner, D. H. Kelly, of the U. S. Light & Heat Corp., and president of the association, declared.

Standard ratings adopted by the association and the Society of Automotive Engineers are now being accepted as the standard for battery construction, Mr. Kelly said. The bus battery at the present time is largely in the experimental stage very much as is the bus itself. While the motor bus has not yet been standardized, the association through its technical committee, is studying the situation, and is rendering important service.

The next convention will be held in March, in Philadelphia.

WIDER TIRES LIFT MAINE TRUCK BAN

AUGUSTA, ME., Nov. 13—Maine has lifted the ban upon heavy motor trucks that has been in effect annually from Nov. 6 until June 1 whereby they were not allowed to use certain highways at all, and other routes only if loads were cut down about 50 per cent. Now the large commercial vehicles may use all highways on the same basis as the lighter trucks throughout the year. The new order is based upon tire width and permits a maximum gross weight of seven tons on vehicles having a 14 in. tread and scales down to one ton on vehicles with 3 in. width of rubber. This is in keeping with the general law in other states.

Ryan-Lite Gets Approval of Registration Bureaus

SCHENECTADY, N. Y., Nov. 15—The Ryan-Lite has been officially approved by the automobile registration bureaus of all states, including the eastern conference which takes in Canada, according to Walter D'Arcy Ryan, the inventor, director of the General Electric Illuminating Engineering Laboratory.

In the tests of the light by the Massachusetts registry of motor vehicles, A. W. Devine of the department, said the greatest source of trouble is inferior headlight equipment supplied by the car manufacturer. To correct this Mr. Devine said manufacturers must take the initiative in supplying non-glare, long-beam and wide range lamps.

Upholds Starter Claims

WASHINGTON, Nov. 16—The Commissioner of Patents has reversed the decision of the board of patent examiners, which rejected claims of John Hasselbring, Jr., to rights of patent on a starter for internal combustion engines, designed to keep the engines in operation. The commissioner held that there was enough difference both in the mechanism and the purpose of the Hasselbring starter to justify patents.

Hoover Notes Gain in Bus-Truck Use

Says Transportation Experts Just Appreciating Possibilities of Coordination

WASHINGTON, Nov. 17—"An outstanding development of the year is the use of the motor truck and motor bus in conjunction with other forms of transportation," Secretary of Commerce Hoover declares in a general review of commerce and industry in the annual report of the Department of Commerce just made public.

"Transportation experts are beginning to comprehend the possibilities of the motor vehicle as a cooperative instead of a competitive factor," the report declares. "Over 50 railroads in the United States and Canada are now using motor trucks to supplement their shipping service; nearly as many more are availing themselves of the motor bus. Quite a number of railroads are experimenting with store-door delivery, some 30 or more use the truck in terminal operations and several have now replaced way freight trains with the motor truck.

"One of our largest railroads has replaced local freight trains on 1000 miles of line and is serving 500 stations with motor trucks. Furthermore, over 14,000 miles of motor bus routes are operated by electric railways. Developments such as these warrant increasing attention to the possibilities of the use of the motor vehicle as an adjunct to other forms of transportation."

Merchants Board Favors Bus Use by Rail Lines

NEW YORK, Nov. 15—The board of directors of the Merchants Association has gone on record in favor of granting bus franchises to existing transit lines in Manhattan, Bronx, Brooklyn and Queens, so that these lines may be supplemented and extended by additional buses. The action was taken following analysis of the report of the board of transportation covering 106 applications for franchises and favoring an independent bus system.

The Merchants Association rejected the plan for the independent system and the routes proposed, because it "disregards the principle of unification and economic utilization of existing means of transportation and fails to consider the property rights of the companies now operating."

Walker Expands Foundry

RACINE, Nov. 15—Walker Mfg. Co. is increasing its foundry capacity 50 per cent to permit of increased production. Outlook for business in 1927 is declared excellent by officials of the company.

N.Y. Votes to Build Elevated Highway

NEW YORK, Nov. 13—Construction of an elevated motor highway from Seventy-second street and Riverside Drive to Canal street was assured when the sinking fund commission voted to vest title in behalf of the city in the remaining waterfront property required for the project.

The highway will be built on steel pillars, covered with concrete, at an elevation of 35 feet, and will be fed by ramps at Fourteenth, Twenty-third, Thirty-fourth, Forty-second and Fifty-ninth streets. These will enter at the center of the highway, which is to be 65 feet wide. All cross traffic is to be eliminated, permitting an even flow of north and south bound vehicles.

There will be four lanes devoted to express traffic, accommodating about 1000 vehicles an hour, while the slower lanes of traffic will handle about 500 an hour. The capacity of these lanes will provide for 5000 cars hourly.

Winter Air Rates Lower Than German Rail Rates

WASHINGTON, Nov. 17—Winter rates for passenger airplane travel in Germany have been reduced to a figure slightly below railroad passenger rates for similar distances, a cable to the Department of Commerce from Howard Taylor, American vice-consul at Stuttgart, states.

It has been decided to keep open 28 air lines in Germany this winter, and they will cover approximately 7000 miles of routes, the cable states. The lines to be operated on a winter schedule are those used chiefly by business men, while those used principally by summer tourists have been discontinued.

The planes used on the winter routes are heated with hot water radiators, which in turn are heated by the exhaust systems of the engines.

Coming Feature Issues of Chilton Class Journal Publications

Dec. 10—Operation and Maintenance—Service Station Equipment Issue.

Dec. 15—Commercial Car Journal—Good Roads Issue.

Jan. 1—Automobile Trade Journal. Annual Show Issue.

Jan. 6—Motor Age. Annual Show Issue.

Jan. 15—Commercial Car Journal—New York Show Issue.

Jan. 27.—Motor Age—Chicago Show Issue.

National Air Transport to Have Cleveland Hangar

CLEVELAND, Nov. 15—National Air Transport, Inc., air wing of the American Railways Express Co. will erect a huge hangar on Cleveland's $1,500,000 airport, it is announced here. A representative of the company which will open a New York-Chicago-Dallas express air line in the spring is expected in Cleveland within a week to conclude arrangements for a lease of a section of the airport.

Before leaving for Washington with Assistant Secretary of the Navy E. P. Warner, Glenn L. Martin announced finally that he has no intention of moving his airplane factory from Cleveland.

Buy Motocycle Taxicabs

SPRINGFIELD, MASS., Nov. 13—Indian Motocycle Co. is delivering six Indian taxicabs to a newly formed company in Newark, N. J., to be called the Indian Taxicab Co., which it is expected will be using from 30 to 40 of these machines soon.

Los Angeles Clears Used Car Practices

LOS ANGELES, Nov. 13—As a result of the activities of the Better Business Bureau of the Los Angeles Advertising Club in handling complaints against certain individuals selling second-hand automobiles, a group of dealers in second-hand cars have been banded together under the name of the Bonded Automobile Dealers' Association. The purpose of the association, according to Secretary L. W. Andrews, is to raise the used car business to a higher plane and to cause all dealers in second-hand cars to be licensed and to advertise themselves as dealers, in accordance with the city ordinance.

The city ordinance requires that any firm, person or corporation engaged in the sale of merchandise must, in advertising, clearly and unequivocally state that such person, firm or corporation is a dealer. The Better Business Bureau has investigated a large number of automobile advertisements and has found that many persons advertising and selling cars from private addresses are in reality dealers and not private individuals. It is the purpose of the bureau to cause all such persons to advertise themselves as dealers.

Steel Sales Heads Meet

CHICAGO, Nov. 15—Members of the sales departments of companies in the Electric Steel Founders' Research Group have arranged joint conferences as a means of discussing merchandising policies which will be held frequently during the year. It is planned to introduce non-affiliated speakers at these sessions.

Wood Products to Build

CLEVELAND, Nov. 15—The Euclid Wood Products Co., manufacturer of wood parts for automobile makers, has bought additional land adjoining its factory and will erect an addition.

Calendar of Coming Events

SHOWS

Brussels .....Dec. 4-15
Buenos Aires .....Dec. 7-20
Ninth Argentine Automobile Show, Palermo Park.
Cairo .....Feb. 15-March 15
First International Motor Show.
Chicago .....Jan. 10-15
Coliseum, American Road Builders' Association.
Chicago .....Jan. 29-Feb. 5
National, Coliseum, National Automobile Chamber of Commerce.
Chicago .....Jan. 29-Feb. 5
Annual Salon, Hotel Drake.
Colombo .....Jan. 6-16
All-Ceylon Motor and General Engineering Exhibition.
Los Angeles .....Feb. 12-19
Annual Salon, Hotel Biltmore.
New York .....Nov. 28-Dec. 4
Annual Salon, Hotel Commodore.
New York .....Jan. 8-15
National, Grand Central Palace, National Automobile Chamber of Commerce.
Paris .....Dec. 3-19
International Aeronautic Exposition, Grand Palais.
Ponce, Porto Rico .....Dec. 1-12

CONVENTIONS

American Road Builders' Association, Congress Hotel, Chicago....Jan. 10-15
Motor & Accessory Manufacturers Association, Dinner, New York .Jan. 12
National Automobile Dealers Association, Hotel Commodore, New York .....Jan. 10-11
National Automobile Dealers Association, La Salle Hotel. Chicago..Feb. 1-3
National Research Council, Washington, D. C. .....Dec. 2-3
Rubber Association of America, meeting and dinner, Hotel Commodore, New York .....Jan. 10

N. A. C. C.

Chicago, Feb. 1—Service Meeting.
New York, Jan. 10-11—Third World Motor Transport Congress.
New York, Jan. 11—Service Meeting.
New York, Jan. 11—Banquet.

S. A. E.

Cleveland Section, Nov. 29—The Engineer, the Trade and the Owner—David Beecroft.
Detroit, Jan. 25-28—Annual Meeting.
Detroit, Jan. 28—Carnival.
New York, Jan. 13—Banquet.

RACES

Altoona, Pa. .....June 11
Atlantic City .....April 30
Charlotte, N. C. .....May 9
Fresno, Cal. .....April 21
Indianapolis .....May 30
Los Angeles .....Dec. 12
Los Angeles .....Feb. 22
Los Angeles .....April 10
Salem, N. H. .....June 25